



DELIVERABLE A

Context Study, Deepenings & Reflection

"Designing a sustainable solution to hinder the transmission of COVID-19 in refugee camps in Greece"

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1. Context Study



Figure 1. Camp Moria 2017 versus 2020 (Nicolas Economou/NurPhotos, 2017; Dimitris Tosidis/EPA, 2020).

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1.2 Preliminary Research

1.2.1 Our challenge

During this project, we will focus on the question: “How can we design a physical, sustainable solution - a prototype technology - that hinders the transmission of COVID-19 in Greek refugee camps?”

The main goal of our design will be to minimise the transmission of COVID-19 in Greek refugee camps. We have decided to focus on refugee camps because transmission prevention is incredibly tricky there. We choose to do so because large groups of people live in cramped, unhygienic conditions (Welle & Schmitz, 2020). The reason that we chose Greece specifically is that this country houses many refugee camps, with the refugee camp on the island Lesbos, Moria, being the largest one in Europe (Welle & Schmitz, 2020)

In the Greek refugee camps, social distancing is virtually impossible. An example of this can be seen on the Greek islands. Here around 40 000 people are living on five the Aegean Islands, as shown in figure 2. More than 35 000 of those people live in the reception and identification centres (United Nations Refugee Agency, 2020). The RIC is the place in the camp where people arrive and stay for their duration in the centre. Those five centres on the island are built to house a maximum capacity of 5400 people. This means that thousands of people share restrooms and showers with each other, and tents are very closely packed. It is also impossible to wash one’s hands regularly, which is due to water shortages in the camps. Furthermore, not enough PPE, such as face masks or hand-sanitizer bottles, are provided for the refugees.



Figure 2: Refugee and asylum-seekers population in the islands as of 22 March 2020 (population figure on the mainland as of 29 February 2020). (United Nations Refugee Agency, 2020)

Although reducing the transmission of COVID-19 is our end-goal, we will also really focus on sustainability when working on our design. The pandemic has resulted in a sudden surge in usage and production of plastics for PPE. Management of plastic waste was a problem before the outbreak, but the expected amount of waste due to COVID-19 will far exceed the available capacity for plastics and hazardous medical waste. This is illustrated in figure 3 (Klemeš et al., 2020)

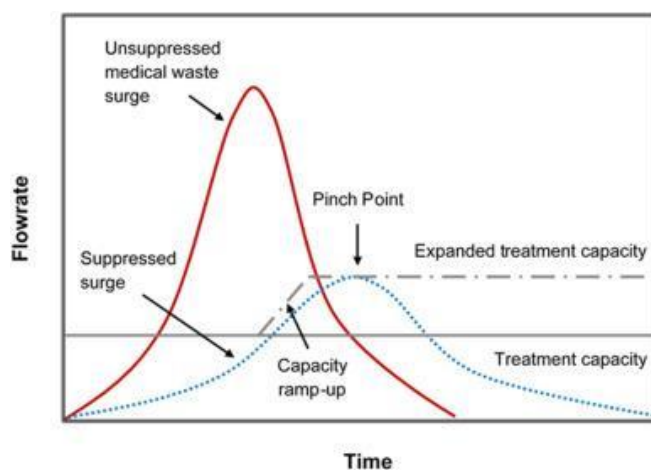


Figure 3. Expected amount of waste (Klemeš et al., 2020)

1.2.1.1 Sustainability

We use a model to define different aspects of sustainability. This model divides sustainability into three dimensions: environmental, social, and economic sustainability.

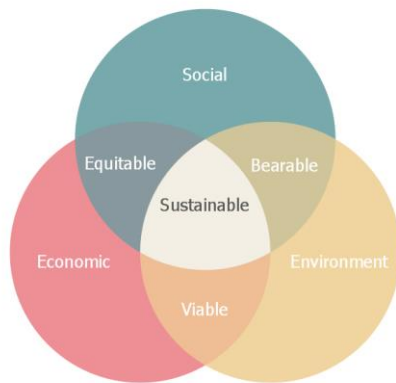


Figure 4. Sustainability diagram (Sustainable development, n.d.)

This diagram describes how all the three dimensions are connected and how sustainability can only be reached if all of them are functioning sustainable on their own. So, when designing a solution, problems in all three dimensions need to be addressed.

Social sustainability

There is no set definition for social sustainability, although it is frequently used in literature (Lee & Young, 2019). Boyer et al. (2016) believe that the lack of definition is because social sustainability is context-specific. One of the descriptions given by McKenzie (2004) is: “*Social Sustainability is a positive condition within communities and a process within communities that can achieve that condition.*”

Several indicators say something about those conditions according to McKenzie.

These indicators concern:

- Equity
- Diversity
- Political participation, preferable on a local scale
- Cultural relations
- Community ownership and responsibility
- Mechanisms in case, not all needs are met by the community. (This can be the case for things like education)

So, social sustainability is related to the general wellbeing and quality of a group or community. This includes, next to the indicators given by McKenzie, the extent to which individuals can meet their basic needs and have the capabilities they have.

Upon that, it has to do with how positively individuals perceive the society they live in. So, we should ensure that our design has a positive impact on the wellbeing within Greek refugee camps (Magee et al., 2012).

Economic sustainability

Economic sustainability is generally about creating a maximum profit, with resources that are as cheap as possible and efficient (Durant et al., 2015). In the context of the refugee camps in Greece, it should be considered that such a setting is more like a developing country. This means that economic sustainability changes. In this case, when designing something sustainable for this specific stakeholder, it will be about reducing inequality and thus making sure the cost and benefits are in balance

(Popovic et al., 2013). So, to design something sustainable that reduces inequality, and thereby gives everyone the chance to buy it, is more important than attaining maximum profits.

Environmental sustainability

Environmental sustainability can be described as the use of resources, waste, and direct utility (Durant et al., 2015). Also producing the least amount of greenhouse gas emissions is part of environmental sustainability. These factors in the context of the refugee camps in Greece means that something needs to be assembled close by, with local resources that will generate the amount of non-degradable waste as possible.

The focus in Greek refugee camps is survival and protection, so sustainability is not high on the priority list of residents and authorities (Norwegian Geotechnical Institute & Eckbo, n.d.). If there is PPE available in Greek refugee camps, this is almost always made from plastics. Usually, there is little organised waste disposal, let alone recycling initiatives (Norwegian Geotechnical Institute & Eckbo, n.d.). Because of the disproportionate populations of the camps, the plastic usage can be excessive, especially when PPE becomes more standardised and accessible for the refugees.

Therefore, we must take environmental sustainability into account when we are designing our product. We intend to minimise plastic usage but will ensure to use more sustainable types of plastic when we do.

In short, our goal for the project is designing a product that will minimise COVID-19 transmission in Greek refugee camps. During the design progress, we will focus on environmental, social, and economic sustainability.

1.2.2 Required information and relevance

Our challenge essentially consists of two parts: minimising COVID-19 transmission and sustainability. Therefore, we need to gather a lot of background information about those two themes. In this section, the required information for both categories, as well as its relevance, will be summarised.

1.2.2.1 Minimizing COVID-19 transmission

To minimise COVID-19 transmission, we need to understand COVID-19 transmission. Therefore, we must do a lot of background research about how the virus can spread from person to person. To achieve this, we will study subjects such as virology and epidemiology. Jordan will work on this for his deepening, but we will make sure to all have a basic knowledge of these topics. If we understand transmission, we will be able to think about how it can be reduced precisely.

Furthermore, we need to be very aware of the situation and organisational structure within Greek refugee camps. The circumstances are vastly different than the ones we know and are accustomed to. We need to consider that the options for specific infection prevention methods, such as social distancing, are minimal. Additionally, if we can identify the main issues with transmission prevention within these circumstances, we will be well-equipped to find solutions for these issues within the given possibilities.

Lastly, we need to research the measures that have currently been implemented and the effects they have had on the transmission of COVID-19. If a particular decision has had a significant positive impact, we could look further into what has caused that. We

can then identify factors that contribute to an effective solution. Similarly, if a measure has proved to be ineffective, this will prevent us from making unnecessary mistakes. We will look at the actions that have been implemented globally, to gain a broader context. However, our focus will be on the current situation in Greek refugee camps.

To summarise, we will research three main subtopics with regards to the reduction of transmission. First, we will look at the factors that influence the transmission of COVID-19 in general. Additionally, we will research the circumstances, possibilities, and restrictions within Greek refugee camps. Lastly, we will investigate the measures that have been implemented globally, as well as locally in the camps, and the effects they have had.

1.2.2.2 Sustainability

To create a sustainable design, we need to be aware of the factors that influence how sustainable a product is. To achieve this, we will first investigate sustainable materials. Femke will focus on the chemistry of biodegradable plastics for her deepening since there is a real chance that at least a part of the product will contain plastic. However, we will also investigate alternatives to plastics to ensure that we choose the most sustainable possibility. In addition to this, the material needs to be relatively cheap, so that the final product will be affordable for less wealthy individuals.

The second component of environmentally sustainable design is a sustainable production process. This means first that hazardous waste, or other waste that is difficult to dispose of, must be limited. Additionally, the emissions of carbon dioxide

(or maybe carbon dioxide footprint) and other greenhouse gases should be kept to a minimum. We will thus investigate alternatives for greenhouse gas production and research on how companies have achieved carbon neutrality and have little waste so that we can learn from their methods.

Lastly, we will look at the ways our product can be recycled. Often, PPE cannot be used indefinitely and must be disposed of quickly. We will, therefore investigate the recycling of plastics and other materials. We will also explore waste disposal methods. In this way, we can ensure that our product will not add to the excess of waste that the world is currently faced with (Klemeš et al., 2020).

During this process, there will also be research done on the economic and social sustainability. So, we will be sure that by the end, our product fits our stakeholders and their capabilities, and the product can be produced cheap, so it stays accessible for our intended users. More information on social sustainability can be found in chapter 1.5.2.1.

1.2.3 Conceptual and theoretical elements

Several concepts and models have influenced the framing of our challenge. We have been introduced to the theories in the project lectures and through individual research. In this section, the most prominent theoretical elements and their influence on our challenge will be discussed.

1.2.3.1 Design ethics

During the design process, it is vital to consider the wanted and unwanted mediations of an artefact (Gonzalez Woge & Sivakumar, 2020a; Verbeek, 2006). We will therefore consider the unexpected or even undesired mediations that may come with our design and use these considerations to limit adverse mediation effects. Furthermore, our primary goal will be to design something that can be used for positive mediation.

1.2.3.2 Technological mediation

Technological mediation concerns the role of technology in the experiences and actions of individuals and groups. In practice, this means that people can use artefacts to connect with their environment. They can also use technology to a particular end. Often, the technology at hand influences the action an individual chooses to take (Gonzalez Woge & Sivakumar, 2020a; Verbeek, 2006).

Building on this concept, we will make sure that we are aware of the mediations that come with our design. We will aim to design something that actively influences the behaviour of individuals, in which our goal is to stimulate the use of transmission prevention methods.

1.2.3.3 Hard and soft impacts

Soft impacts are how our solution affects relationships between people and the norms and values of a society. Hard impacts relate to more functional aspects of our solution, such as how it will affect the environment or economy.

1.2.3.4 Capability approach

We have been introduced to capability centred design in one of the project lectures and the corresponding reading. A core concept within the capability approach is that every individual should have access to ten basic capabilities (Gonzalez Woge, Sivakumar, 2020b; Oosterlaken, 2012).

We will design for life and bodily health by decreasing the transmission of COVID-19 within the refugee camps. We will also create for other species, which means that we will make our design as sustainable as possible. Furthermore, we are designing for senses, imagination and thought. Finally, we will design something that stimulates the control over one's material environment, meaning that we will try to increase the availability of PPE.

We will have to make sure that we design an artefact that is not only good but also appropriate for our stakeholders and their capabilities (Gonzalez Woge, Sivakumar, 2020b; Oosterlaken, 2012).

With every iteration, we will make sure to reflect on the potential soft and hard impacts and their moral implications with the knowledge we gain from existing solutions. This is essential to ensuring that the system or product we develop is sustainable in the context of its use. Therefore, in the following chapters there will be given more insight in these concepts and models and how they apply in the context of our challenge.

1.3 Urgency of our challenge

To say that refugees experience stress is a profound understatement. They must deal and cope with migration, war, oppression, forced detention, violence, and witness death and destruction. They suffer abuse from smugglers, criminals, and governments' (Papadimos et al., 2020). They are exposed to poverty, abuse from locals and fellows, to human trafficking, rape, malnutrition, and inhumane living conditions.

Disease, insects, cold, uncontrolled amounts of waste, impure water, congestion, and increased sexual abuse have led to violence in Greek camps, as seen in Moria, where almost 13.000 people were left homeless after their camp was burnt down to ashes.

Pictures on Instagram show the current situation.¹²³

The situation is so dire that children as young as ten years old are attempting suicide (Fallon & Beaumont, 2020).

The international public health community is concerned about childhood morbidity in the refugee camps of Greece. Kampouras was one of the first groups to investigate and report on the disease burden of camps among children. They divided the illnesses that occurred over the winter of 2016–2017 into infectious and non-infectious categories. Children less than the age of 12 years were usually presented with infectious causes (nearly 81%). The most common infections in younger patients

¹ https://www.instagram.com/p/CFd9zvqFH-C/?utm_source=ig_web_copy_link (Arendonk, 2020)

² https://www.instagram.com/p/CFkB0SHhiZo/?utm_source=ig_web_copy_link (Arendonk, 2020)

³ <https://www.instagram.com/p/CFC2i2bAeEj/?igshid=2sbcdpjky5fe> (Tzortzinis, 2020)

included infections of the respiratory tract (67%) (Kampouras et al., 2019). This report only shows the disastrous potential an outbreak of COVID-19 can have in many refugee camps in Greece.

By 2020, the total number of refugees who had travelled through the island, Lesbos - one of the biggest points of transition for refugees in the world, was close to one million, which is an enormous number for an island with 90,000 people.

In early 2020, it held about 20,000 people, whereas its facilities had been designed for fewer than 3,000 people (Jauhianen, 2020).

This case illustrates how extremely vulnerable people are neglected in times of severe economic, social, and political challenges and distress, such as the COVID-19 pandemic (Jauhianen, 2020).

Refugees in Greek camps are left unprotected against the life-endangering COVID-19; they do not have access to the necessary medical services provided by the state and other authorities. They do not have proper shelters. Thousands of them live in tents. They have minimal access to water and sanitation, an example of this can be seen in the Instagram post in the footnote⁴. They live in deplorable conditions and overcrowded places, so they cannot keep social distance; they do not have hand sanitizers, facemasks or even the needed medicine to treat a simple cold. An outbreak of COVID-19 in most of the refugee camps in Greece can have devastating consequences and can result in a disproportionate amount of life loss and suffering.

⁴ https://www.instagram.com/p/B5127oYBYEZ/?utm_source=ig_web_copy_link (Pedersen, 2019)

Also, during this time of COVID-19, all three of the dimensions (social, economic, and environmental) of sustainability are hampered. While this is causing a big problem next to the pandemic itself, it also gives the world an opportunity to work together (Mukkaram, 2020) like countries have done the last couple of months. According to the United Nations (n.d.) this is the time to reach sustainable development.

It is for all these reasons that urgent and immediate action needs to be taken now! Now we have the possibility to design something for COVID-19 in Greek refugee camps that has impact, reduces the transmission, and creates sustainability.

1.3.1 Existing initiatives

As some context of the situation in Greek refugee camps is provided, the following existing initiatives are going to be depicted with the specific focus on the island, Lesbos, and its refugee camp, Moria. This seems to be the most prominent example since it is highly disproportionately overcrowded and insufficiently sanitised as described above:

The WHO reports that *“[i]n a catastrophic fire that broke out on 8 September 2020, the Moria reception and identification centre for asylum seekers and refugees in Lesbos, Greece, was burned to the ground. The world turned its attention towards the Greek island as some 12 000 refugees, and migrants were left without shelter, food, or access to health-care services. With 35 refugees and migrants having tested positive to COVID-19 a few days before the fire, the situation was particularly urgent, calling for immediate action and coordination”* (2020).

The specialised agency of the United Nations responsible for international public health has coordinated great efforts in response to this humanitarian crisis. European organisational bodies and the Greek authorities (Greek National Public Health Organization (EODY) taking the lead) have mobilised on the ground trying to maximise their impact. A tented living structure is already established in efforts of providing refugees with a substitute for shelter (World Health Organization, 2020).

“A total of 22 team members, including medical doctors, nurses and paramedics of diverse specialisations, worked with local authorities and health professionals to triage, test, isolate and treat COVID-19 patients at the new site and to provide

medical support to people in need. WHO's background work to make this happen ranged from customs clearance for shipments of medical supplies and equipment, organisation of their transportation and storage, coordination of initial briefings on security and public health, and provision of Farsi and Arabic interpreters.” (World Health Organization, 2020).

This situation clearly underlines the hard work the WHO is performing and coordinating these days. However, there is no clear indication of these efforts as to how to prevent the transmission of COVID-19 within the newly established tented living structure or to provide proper mechanisms of sanitation to ensure that the spread of the novel coronavirus can be minimized. This is a tremendous shortcoming and unfortunately, it is not unprecedented. Similar shortcomings were to be observed in the camp before the ongoing tragedy.

Although multilateral research has been done on existing initiatives in Moria with regards to helping flatten the curve of infections with COVID-19, there is an alarming tendency. The international community tends to handle the situation in Moria reactively. On a European level, intentions to restructure the system to improve the living conditions of asylum seekers seem to lose velocity, mainly due to friction forces between European and national law as precisely analysed by the University of Maastricht.

The initial implementation design of the EU's asylum policy foresees that Member States would realize the Common European Asylum System (CEAS) largely through deploying their resources. *“Initiatives [...] follow [...] emergency-driven trajectory of*

intra-EU solidarity, rather than structurally embedding solidarity and fair-sharing of protection responsibilities into the EU's asylum policy. Until there is a permanent redesign of the CEAS, it will arguably be impossible to realise the legally binding principle of solidarity and to ensure human health and dignity, in the time of coronavirus and beyond" (Tsourdi, 2020).

On Tuesday, 15 September 2020, Germany announced to evacuate 408 families from Moria, rescuing in total 1,553 individuals (Noticas, 2020). In the meantime, Greece has reported the first person to have fallen victim to SARS-CoV-2 (Koutantou, 2020) - a 61-year-old male. Even though Germany's action contributes to resolving this humanitarian crisis, other Member States seem to be very passive when it comes to their involvement in undertaking actions towards constraining the outbreak of COVID-19 in Greek refugee camps. However, this is not an insight that applies only to European bodies. In the undertaken research, the lack of initiatives with regards to hindering the transmission of COVID-19 in Moria and other refugee camps is strikingly alarming. International and non-governmental bodies focus on how to milder the consequences of the outbreak instead of reducing its magnitude. This is the real challenge. Because initiatives (and the lack of them) do not address the cause of potential outbreaks – which is indeed the greatest shortcoming which can result in disproportionate life loss and suffering.

This fact is however, not to be confused with improper action or inaction of the previously mentioned organizations. Many ongoing initiatives address the mental well-being of asylum seekers (Refugee Trauma Initiative, 2020), the housing

emergency situation on Aegean islands (European Commission Initiative, 2020), the educational infrastructure for children from refugee families (Theirworld's in collaboration with Nationale Postcode Loterij and Education Cannot Wait, 2020), the provision of medical supplies, treatment or nutrition (World Health Organization, 2020; UNICEF, 2020; United Nations Refugee Agency, 2020) or the provision of statistical data about COVID-19 in refugee camps (Greek Impact Initiative, 2020).

1.3.2 Consulted resources

In this stage, different resources were addressed to gain an overview and better understand the identified challenge. Peer-reviewed literature, quality-journalism and social media posts were consulted to properly depict the situation on the ground.

Different databases with scientific papers created by many experts were taken into consideration, the reliability of quality journalism sources was examined and social media posts from various sources were considered. The American Psychology Association's recommendations of citation were implemented in the undertaken research and a list with references is provided at the end of this document for further investigation of the consulted literature.

In the next stage of the project's progress, the need for relying on primary resources of information appears to be crucial to the development and the more in-depth.

1.3.3 What do we want to research in the limited time you have?

As we only have a single semester to work on this project and treat the topics with the level of precision that they deserve, it is imperative that we carefully prioritize what we research. Now that we have a more in-depth understanding of the social and technical aspects of our design challenge, we want to study how a disease spreads within the context of an overcrowded refugee camp. A deeper knowledge of the dynamics at play within the epidemiological situation in refugee camps in Greece would inform us on how we can reduce the transmission of Covid-19 most effectively. We also know that it is essential that we reach out to people who are close to the problem. This could be refugees, local and national authorities, the European Union or any other working forces who are closely linked to Covid-19 in Greek refugee camps. Our current leads include:

- The Hellenic National Public Health Organization (EODY) who oversee surveillance and control of infectious diseases in Greece (European Centre for Disease Prevention and Control, 2020).
- Connecting Hands, a student union initiative aimed at connecting students in the Netherlands with asylum seekers.
- European law experts at the University of Maastricht who are researching the implementation of the European Union's asylum policies.
- People's PPE, an initiative organised by the United Nations High Commissioner for Refugees (UNHCR) which offers small-scale manufacturing jobs to Syrian refugees in the Zaatari camp in Jordan, while also supplying the

camp and local area with reusable masks, shields and gowns (Sabrina Barr, 2020, Independent).

- The World Health Organization

We also want to conduct further research in the fields of economics, organic chemistry and product design as these topics will help us to design a solution that is economically, socially, and environmentally sustainable.

1.4 Design Ethics and Technological Mediation

1.4.1 Technological Mediation

It is important to acknowledge that technologies are not neutral. They play an active role in what we do and how we do it (this is known as the existential dimension of the technology) as well as in how we experience the world around us (this is known as the hermeneutic dimension of the technology), (Ihde 1990; Verbeek 2005, 2011). The framework of technological mediation allows us to acknowledge and analyse this role.

1.4.2 Intended scripts

We need to predict, as best we can, the changes in behaviour or experience brought on by our solution. This means we must have an in-depth understanding of the people who will use our technology and take a critical stance throughout the design phase on how our technology could negatively affect these stakeholders, especially when it comes to long-term use. The primary concern of our solution will be slowing the spread of coronavirus in refugee camps such as Moria Camp in Greece. However, we must understand that any technological fix may have unforeseen consequences. These consequences can affect the refugees directly (such as a PPE made from an irritating or slightly toxic material) or indirectly (such as a solution that is not economically sustainable and results in further financial problems for the government or NGOs working locally).

Without knowing what form our solution will take, it is hard to describe which intentional scripts or mediations we will implement in our design. However, these ideas are still very useful in helping us think about how to best achieve our goal. For

example, a face mask has a built-in script, which tells the wearer not to cough or sneeze into their hands. This is the existential dimension of the technology. When a large proportion of the people we see in our daily lives are wearing masks, it may remind us of the presence of the virus (this could then indirectly affect our actions by making us more careful etc.). In this sense, masks change how we view the world. This is the hermeneutic dimension of the technology.

So how would script affect how we design our solution? If we wanted a face mask that prevents the user from touching their face, we would design the mask so that it can be adjusted to fit different sized heads comfortably, therefore reducing the wearer's impulse to constantly adjust the mask while wearing it. If we wanted a mask that reminds people to be wary of spreading the virus, we could ensure that the masks are brightly coloured (of course the number of people wearing the masks would have a larger effect, but accessibility and implementation of our design will come later).

Our priority for the design, is that it slows the transmission of coronavirus in refugee camps in Greece in a way that is sustainable. It is important then, to define what we mean by sustainability in the context design ethics and technological mediation. A technology will have soft and hard impacts (Verbeek, 2015). Softs impacts include how a technology affects the norms and values in a society. We want to understand the context of our design's use, as well as the different cultures within the refugee population in Greece, in order to minimize any negative impacts of our design on culture (note that phenomena affected by soft impacts change more slowly than those affected by hard impacts). Hard impacts have a more quantifiable risk. They affect

things like unemployment, health, and the environment. By taking a critical stance on the soft and hard impacts, we will make our design as sustainable as possible within the context of its use.

1.4.3 Lemniscate

Here is a model describing the relationship between our stakeholders and our design

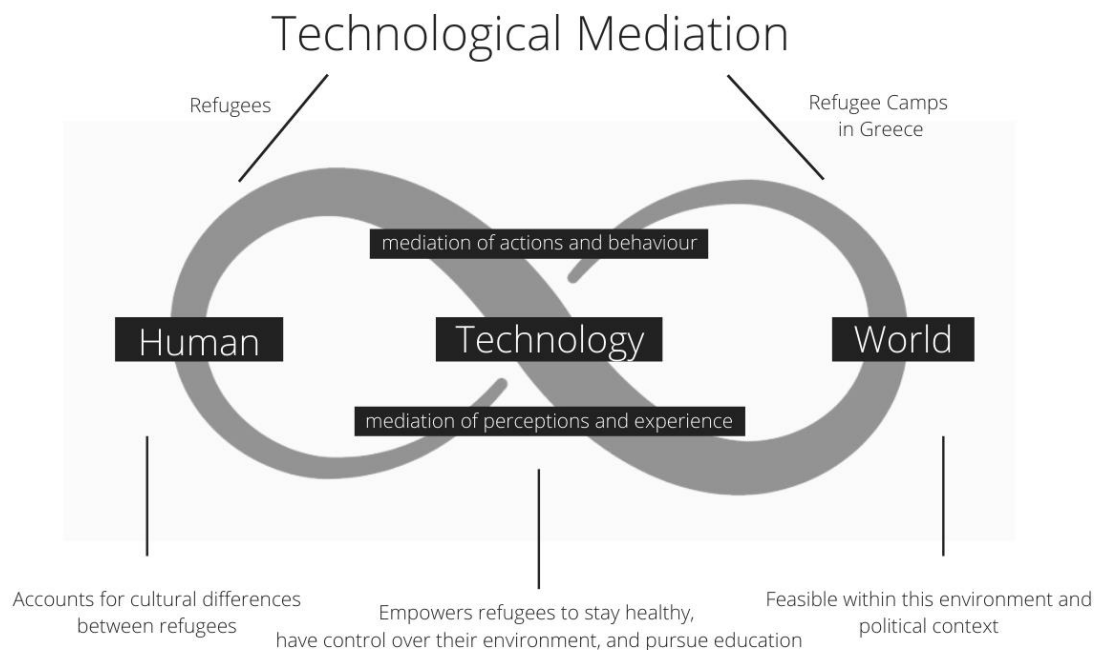


Figure 5. Technological Mediation.

The point of this model is not to represent concrete causal relationships between the variables, but to acknowledge and visualize the dynamic flow across the variables. The lemniscate represents the intermediation of humans, technology, and their environment. In other words, it shows two things:

- How humans affect the world using technologies (in this case tools that increase abilities like motor and cognitive functions)

- How the world affects humans through technologies that alter our perception (telescopes, infrared cameras etc.)

How will the interplay of these elements inform our design?

We must understand the cultural differences between refugees so that we can design inclusively and understand whether our design is appropriate in the context of its use (Oosterlaken, 2012).

We want our technology to facilitate the capabilities (Nussbaum, 2002) of refugees, without pushing our own priorities on them. In other words, our aim is to create external conditions that allow the refugees to keep themselves and others healthy, and to use their senses, imagination, and freethought to pursue education. We aim to do this in a way that does not decrease the already low level of financial control they have over their environment.

It is also important that we understand the constraints of the specific environment in which our technology will be used. For example, asylum-seekers do not usually have the luxury of social distancing or owning smartphones, so designing a Covid-19 tracking app for use in refugee camps in Greece would be pointless. Also, Greece itself has large-scale financial problems. Without knowing this we would not be able to effectively find long-term funding for our solution.

1.5 Capability Sensitive Design

As stated on the page before, without knowing the specific environment our technology would be used, it will not be possible to design something that can help. So, it is crucial to have a lot of knowledge of the situation in such a camp. To do this properly, firstly, it is important to decide who the stakeholders are. Because the solution is mostly supposed to help those people. Having knowledge about context before starting to design, makes sure the solution can be used in the refugee camps in Greece, like with the example of the smartphone on the page prior. Upon that, it is important to have knowledge on the capabilities of the stakeholders. These capabilities can show where there is room for improvement. Studying and using this gives the opportunity to measure the impact of different solutions, so that it is easier to design a solution that solves the problems. Lastly, it is important to make sure the solution is appropriate. This means that the user will be able to use the solution.

1.5.1 Stakeholders

1.5.1.1 Refugees

People of concern, this includes stateless people, refugees, refugee-like situations, and asylum seekers. In 2019, Greece hosted around 190 900 of them (United Nations, 2020a).

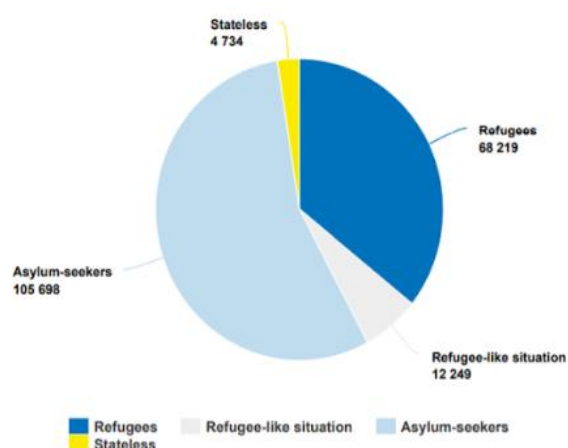


Figure 5: Overview of people of concern in Greece (United Nations, 2020a).

During COVID-19, the measures the World Health Organization’s advice is: “wash your hands regularly, keep distance and self-isolate.” All of these seem to be nearly impossible for refugees in camps. Imagine, for example, Camp Moria on Lesbos. People here are sharing a water tap with up to 250 people (Oxfam, 2020a, June 5). They usually do not have more than 3,5 square meters per person (International Refugee Committee, 2020) and live with up to 20 people in a single container or tent (Oxfam, 2020a, June 5). These are not typical everyday-life situations as we are used to in the Western World, but during COVID-19, it is even worse. Since people are not able to keep any of these measures, it will be impossible to fight the transmission of COVID-19. That means that for these refugees, a solution needs to be found.

1.5.1.2 Children

In the refugee camps, there are a little over 11 000 school-aged children (United Nations Refugee Agency, 2020). Less than 3% of those children have access to formal education. Formal education is official education in local Greek schools. The rest of the children have no access to education or go to non-formal schools in their camps. For refugee children, schools are not only meant and used for tuition, but they also offer psychological help (United Nations Refugee Agency, 2020), proper nutrition (United Nations, 2020c) and a sense of normalcy (United Nations, 2020b; United Nations News, 2020). Due to these factors, education centres are critical. In the earlier stages of COVID-19, the education centres were shut down. At this moment some are opened for a small percentage of the children. When a solution will be found that decreases the transmission for both adults and children, education centres can open again.

1.5.1.3 Volunteers and medical teams

The exact number of volunteers and medical teams in the Greek refugee camps is unknown. What is known is that those volunteers and medical teams are needed in times of COVID-19. With the already limited number of medical professionals, according to Human Rights Watch (2020), it would be even worse if any of them got infected with COVID-19. This will likely happen, due to shortages in PPE, as mentioned in chapter 1.2.1. The same goes for the volunteers, in camps in Bangladesh for example (Nature, 2020), organisations are starting to call their volunteers back, no longer allowing them to go into the camps and help people, due to the risk of them getting and spreading COVID-19. This can have a massive impact

on things like food distribution. Suppose a solution can be found that reduces the chances of volunteers and medical teams getting COVID-19. In that case, they can keep on helping people with both COVID-19 and non-COVID-19 related issues and in this way, increase social sustainability.

The solution found in this project will be used to protect refugees, volunteers, and medical teams during their everyday life in the Greek refugee camps. This solution will also make sure the need for social distancing will be reduced, and thus, children can go back to school.

1.5.2 Sustainability and capabilities

1.5.2.1 Sustainability

When tackling the challenge (“How can we design a physical solution - a prototype technology - that hinders the transmission of COVID-19 and is sustainable and available globally?”) there will be looked at a sustainable way to reduce the transmission. To describe sustainability, the sustainability diagram is used, as showed in chapter 1.2.1.1.

In the case of stakeholders, the most relevant thing is social sustainability. Firstly, there will be made sure that the situation of the stakeholders is fully clear. This gives the opportunity to pick a problem that can be designed for specifically these stakeholders and thus makes sure social sustainability can be reached. After this there will be looked at how different solutions will raise the quality of life. This can only be done when prior knowledge is obtained about the stakeholders, context, and their capabilities. When quality of life is raised to the same situation as before COVID-19 or higher, social sustainability in this case is obtained.

1.5.2.2 Capabilities

Capabilities are part of the Capability Approach, which is set up by Amartya Sen and Martha Nussbaum. Nussbaum (2007) describes the Capability Approach as:

“The Capability Approach, as I have developed it, is a species of a human rights approach. It makes clear, however, that the pertinent goal is to make people able to function in a variety of areas of central importance.”

A way to figure out where social sustainability can be improved, is by looking at what capabilities have been lost. These capabilities will show problematic areas.

To use the Capability Approach in such a way, Nussbaum created a list of ten capabilities:

1. *Life. Being able to live to the end of a human life of normal length; not dying prematurely, or before one's life is so reduced as to be not worth living.*
2. *Bodily Health. Being able to have good health, including reproductive health; to be adequately nourished; to have adequate shelter.*
3. *Bodily Integrity. Being able to move freely from place to place; to be secure against violent assault, including sexual assault and domestic violence; having opportunities for sexual satisfaction and for choice in matters of reproduction.*
4. *Senses, Imagination, and Thought. Being able to use the senses, to imagine, think, and to reason—and to do these things in a “truly human” way, a way informed and cultivated by an adequate education, including, but by no means limited to, literacy and basic mathematical and scientific training. Being able to use imagination and thought in connection with experiencing and producing works and events of one's own choice, religious, literary, musical, and so forth. Being able to use one's mind in ways protected by guarantees of freedom of expression with respect to both*

political and artistic speech, and freedom of religious exercise. Being able to have pleasurable experiences and to avoid non-beneficial pain.

5. *Emotions. Being able to have attachments to things and people outside ourselves; to love those who love and care for us, to grieve at their absence; in general, to love, to grieve, to experience longing, gratitude, and justified anger. Not having one's emotional development blighted by fear and anxiety. (Supporting this capability means supporting forms of human association that can be shown to be crucial in their development.)*

6. *Practical Reason. Being able to form a conception of the good and to engage in critical reflection about the planning of one's life. (This entails protection for the liberty of conscience and religious observance.)*

7. *Affiliation.*

a. *Being able to live with and toward others, to recognize and show concern for other human beings, to engage in various forms of social interaction; to be able to imagine the situation of another.*

(Protecting this capability means protecting institutions that constitute and nourish such forms of affiliation and protecting the freedom of assembly and political speech.)

b. *Having the social bases of self-respect and non-humiliation; being able to be treated as a dignified being whose worth is equal to that of others. This entails provisions of non-discrimination based on race, sex, sexual orientation, ethnicity, caste, religion, national origin.*

8. *Other Species. Being able to live with concern for and in relation to animals, plants, and the world of nature.*
9. *Play. Being able to laugh, to play, to enjoy recreational activities.*
10. *Control over One's Environment.*
 - a. *Political. Being able to participate effectively in political choices that govern one's life, having the right of political participation and protections of free speech and association.*
 - b. *Material. Being able to hold property (both land and movable goods) and having property rights on an equal basis with others; having the right to seek employment on an equal basis with others; having the freedom from unwarranted search and seizure. In work, being able to work as a human being, exercising practical reason and entering meaningful relationships of mutual recognition with other workers.*

According to Nussbaum (2007), the idea is to give every human on earth a minimum of those capabilities. From there, countries can start developing towards even better standards. For the refugee camps in Greece, these capabilities were already not being met, but now during COVID-19 the situation has gotten even worse. This has affected some capabilities.

Life and Bodily health

Firstly, and most importantly, is the harm towards the capabilities of “Life” and “Bodily health”. Because of the immensely high transmission rates and the lack of proper hospitals and health employees, the capabilities “Life” and “Bodily health” are in danger. Not only for the inhabitants of the camps, but also for the volunteers and doctors on site. Since there live around 204 people per thousand square meters in camp Moria (International Rescue Committee, 2020), the hazard towards these capabilities grows even bigger. Not only do people die from the virus, they also suffer long-term, or in some cases even life-long, consequences of the virus. The 2nd of September 2020, the first positive case in Camp Moria in Greece was reported according to different news sources (BBC, 2020; infomigrant,2020). A modelling study done by Tucker Gilman et al. (2020) shows the consequences of a big outbreak in Camp Moria when no measures are taken, for both high and low transmission.

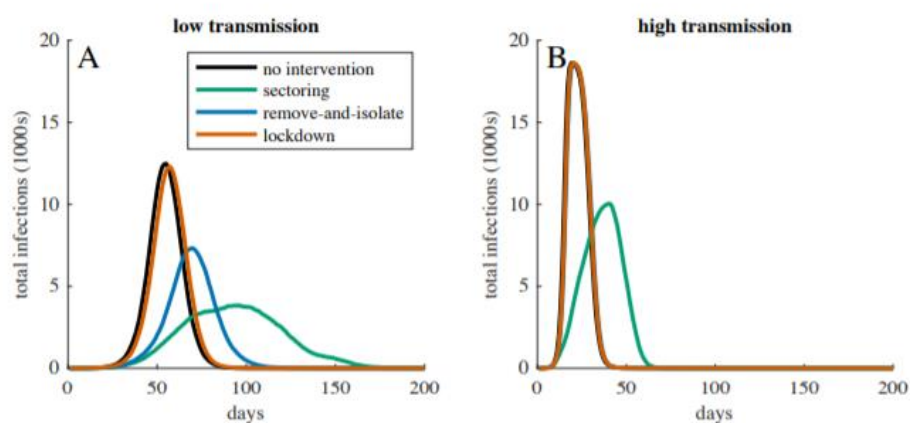


Figure 7: Total infections over time (Tucker Gilman et al., 2020).

With such a rapid spread it is even more difficult to isolate infected groups. Also, according to Jervelund et al. (2019) it was already not possible to meet the medical

needs of the refugees before COVID-19. This means that if such a big outbreak happens, it will be impossible to help all the refugees properly. Additionally, once the virus starts spreading through the camps, all control will be lost and thus the capability of Life and Bodily Health is in big danger.

Senses, imagination and thought

The capability “Senses, imagination and thought” was already being severely hindered in refugee camps in Greece before COVID-19. The capability exists of different facets, but during COVID-19 education has been the one that is most harmed. Due to the social distancing rules, schools shut down, just like almost everywhere else in the world. According to Theirworld (2020), a charity that is trying to end the education crisis, the education buildings in camp Moria are partly open again. Sadly, due to the fire that destroyed the camp a short time ago, education centres are now used as a shelter instead of for education. Due to COVID-19, most education centres are open with some restrictions that only allow for half of the capacity. Also, the education for girls is in big danger. The Malala Fund (2020) has estimated that half of the refugee girls will not return to secondary school after the crisis is over. This can differ from country to country, but the numbers are all still shocking. This means that the capability senses, imagination, and thought is under a high threat. Not everyone has access to adequate education.

Other species

Even before COVID-19, refugee camps were bad for the environment. Now it is getting even worse, due to COVID-19. To stop the transmission of COVID-19,

equipment like bottles with soap or hand sanitizer and disinfecting wipes are handed out (UNICEF, 2020), all including plastics. This may not seem like much, until one looks at the number of people that live in refugee camps in Greece. Also, things like this can mostly be used for a short amount of time, until it is used up. After that, the circle will start over again and all those products will be thrown away after some time, which will increase the environmental problems even more. It gets even worse when seeing that these bottles take 450 years to biodegrade (WWF, 2018). Looking at Sustainable development, this threat towards the environment has an influence on environmental sustainability.

Control over one's environment (Material)

The last pressing capability is the one “Control over one’s environment” in this case specifically the “Material” side. This capability is being especially harmed during times of COVID-19, due to the lack of medical supplies and protective equipment (International Rescue Committee, 2020). Since the price of PPE has increased with at least 1000%, according to sources like the CNN (2020) and BBC (2020), it has been hard for refugees, volunteers, and health employees to get their hands on this equipment. Also, multiple countries have implemented export bans for equipment like facemasks (UNICEF, 2020). Due to these circumstances, most refugees, volunteers, and health employees are not able to hold goods, in this case PPE, on an equal basis with others. Looking back at sustainable development, this means that in the field of economic sustainability something needs to change to decrease inequality.

Combining both the fields of sustainability and capabilities gives us direction. Important is to notice that the other capabilities can also fit in the diagram of sustainable development. On most of those capabilities there is work needed as well. In this case, where COVID-19 is addressed specifically, these capabilities are not harmed as much. Since more capabilities fall into one dimension of sustainable development, these dimensions can be used as an overview. While the capabilities can be used to measure or investigate something more in depth. This means that in this project, sustainable development will be the bridge between the different capabilities to connect them to reduce the loss of the most important capabilities, Life and Bodily health.

When connecting capabilities back to sustainability, it is a bit more difficult than with the other dimensions. Because when a way to reduce the transmission, while keeping an eye on economic and environmental sustainability, is found, then social sustainability and thus sustainability will be reached. This is because reducing the transmission and reaching economic and environmental sustainability will allow for education, health, a better environment, and accessibility and thereby allowing for full social sustainability.

1.5.3 Designing an appropriate technology

Designing something that accounts for human diversity is essential. If not, something great can be developed, but there might be a chance that the intended user is not able to use it. An example of this is a web page for farmers in rural Africa, which might be very convenient to educate them on how to deal with dryness, because everyone deserves this knowledge. However, if they cannot read the web page, nor access it due to the lack of internet, designing this web page would not make sense. For them to better their life, by providing education, there must be thought about the user and their context. So, a new design must be appropriate, otherwise it will never expand one's capabilities.

1.5.3,1 Defining an appropriate technology

Firstly, appropriateness does not have a single definition, it can be seen in many ways, mostly depending on its context. In the light of appropriate technology, synonyms used can be: *"suitability, fitness, applicability and usefulness"* according to Oosterlaken & Hoven (2012).

To fully understand appropriateness and what it means for technology, there is a list of things to consider. All these things that influence appropriate technology are summarised by Oosterlaken & Hoven (2012) in their book: "The Capability Approach, technology and design". This will be used as a guideline to design a solution during this project.

Human diversity

First, it is essential to take human diversity into account. According to Houkes and Vermaas (2010), aside from judging the material for a certain function of a technology, the plan of usage should also be considered. The plan of usage should account for the capacities and circumstances of the user. This leads to the insight that technology or a specific solution will never be appropriate for everyone, and it only gives opportunities to help a particular group.

Good-, poorness and (in)appropriateness

A technology can be good or poor. It can work well or not. This is something different than appropriateness. According to Franssen (2006, 2009) poor or good is relative to the expectations about the stakeholders and context. Those ideas exist of the properties (p) of such a technology (t), and those are related to the assumed abilities (aa). This is related to the real abilities (ra). Here the difference between goodness and appropriateness can be made clear. Something can be good, so when something is functioning well. This can be said regardless of whether the real abilities match the function of the technology or not. That does not really matter, because the technology can still be a good technology. When something is appropriate, the assumed abilities will match the real abilities. So, the user will be able to use the technology.

Balance of reasons

When looking at good and poor and appropriate and inappropriate there can be four scenarios identified. K is where the technology will be used for. So, for example, a

calculator on the phone is good for calculating. C states the circumstances for which the technology will be used.

1. T is a good K and appropriate for p in C
2. T is a good K, but inappropriate for p in C
3. T is a poor K, but appropriate for p in C
4. T is a poor K and inappropriate for p in C

For those scenarios, the user would have a preference. Number 1 is the most attractive, while number 4 is the least attractive. Picking between number 2 and 3 depends on the definition of both poor and good and appropriate and inappropriate. This is dependent on human diversity. Something can also be useless for a certain goal; this can be the case due to the circumstances or capacities. This is something completely different than whether it is inappropriate or poor. When such a thing happens, something is extremely inappropriate.

Moral judgments

Lastly, moral judgments play a role as they might have implications with the safety of a certain technology. A safer technology would be considered as morally better. The same has to do with appropriateness; if something is appropriate for a bigger group of people, it can be argued that it is morally better. This only happens when this technology is important to people, so then people will not like it if they cannot use it.

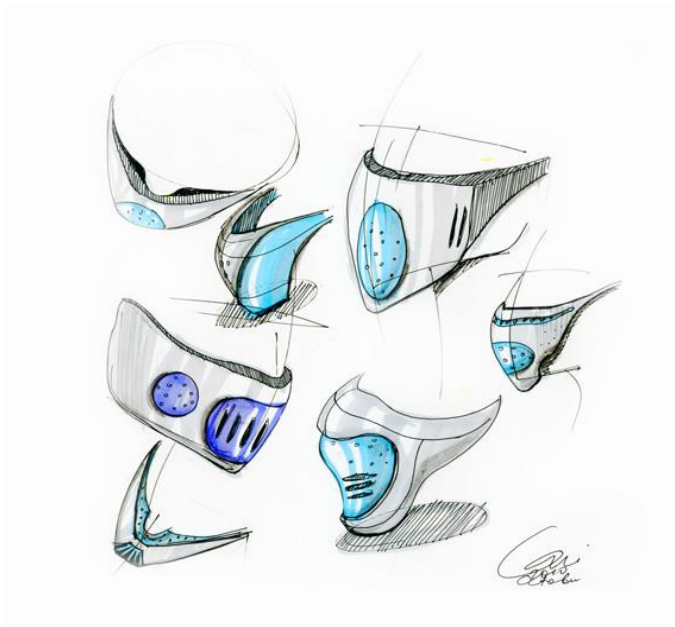
The meaning of this is that, when looking at new technology for a specific stakeholder group, it is important to look at human diversity. So, the next step is to look at the capabilities and context of the user. Upon it should be considered whether the technology is good/poor and/or (in)appropriate and how much this influences each other. So, for example, how poor is poor? Next to that, there also needs to be thought about whether a certain technology is not useless, because this gives a good argument for the intended users to not use it. The last important step is to argue about the moral side of appropriateness. All these concepts give a guideline when designing technology. Keeping an eye on them is extremely important to deliver the right solution. Without these concepts, essential things can be overlooked, which will end in a failed design.

1.6 Responsible Research & Innovation

1.6.1 Visual inspiration

The quick sketches in figure 8 inspire us to think about the visual aspect of design, including shape, colour, and overall appearance. A mask needs to be welcoming but professional, and not scary.

They also inspire us to create a lot of concept sketches before choosing a final design and to be creative with our visualisation of the prototype.



*Figure 8. Face mask sketches
(CariSketching, 2010).*

This protective helmet, in figure 9, inspired us to make something adaptable; a mask or helmet that fits everybody because it is adjustable. It also inspired us to make something neutral. The product should not be gender-based or give any negative emotions because of the way it looks.



Figure 9. Protective Mask (Massimo Iosa Ghini, n.d.)

Jupe's health mobile recovery units (figure 10) are an example of what a good and innovative design should entail. A prototype should be usable in every possible location at any given time, be shippable and stackable and be relevant to a variety of problems. We will work towards this level of design.

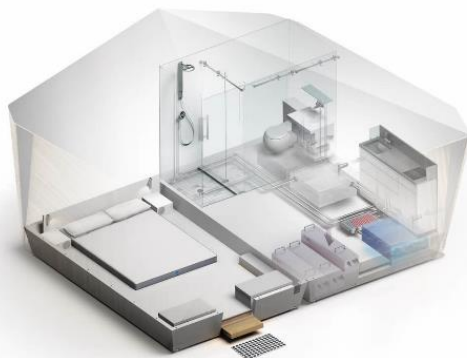


Figure 10 Mobile recovery unit (x-ray (Jupe's Health, 2020))

The idea to design and make an open-source and cheap product, to fill in the lack of products on the market and lower the monetary threshold, is an inspiring achievement. Affordable and easily repairable products are needed in refugee camps. An example of this can be seen in figure 11.



Figure 11. Oshman Engineering Design Kitchen (Rice University & ApolloBVM, 2020)

This idea, figure 12, by the Italian company ISINNOVA, is an excellent way of solving problems. Why do we need to start from scratch with design? Can't we change something ready at hand to fix a problem quickly, cheap and without using a lot of physical resources? This design inspires us to be mindful of existing technologies, we might be able to add or adapt it when designing our prototype technology.



Figure 12. Emergency ventilator mask (ISINNOVA, 2020)

The illustration in figure 13, from the design sketching book *Learning Curves* caught our attention. Apart from the remarkable drawing, it shows the concept of ease of use in a visual form. It is so important that a solution for regular people without special training should always be easy to use.

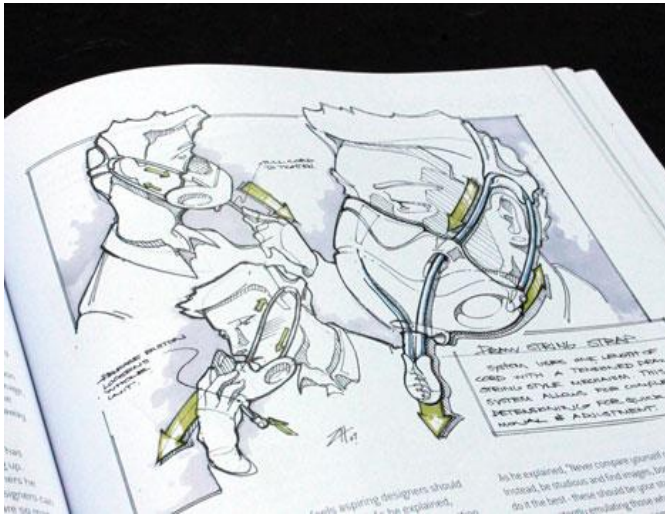


Figure 13. Concept ease of use
(Sjolen & Macdonald, *Learning Curves*, 2011)

The piece of visual inspiration in figure 14 does not seem like an interesting visual at first., However, it is one of the best solutions we have seen thus far. Most concepts are elaborate and innovative but over the top. Something important when thinking about a solution is that it should be based on rigorous testing and research, as well as the simplicity of function.

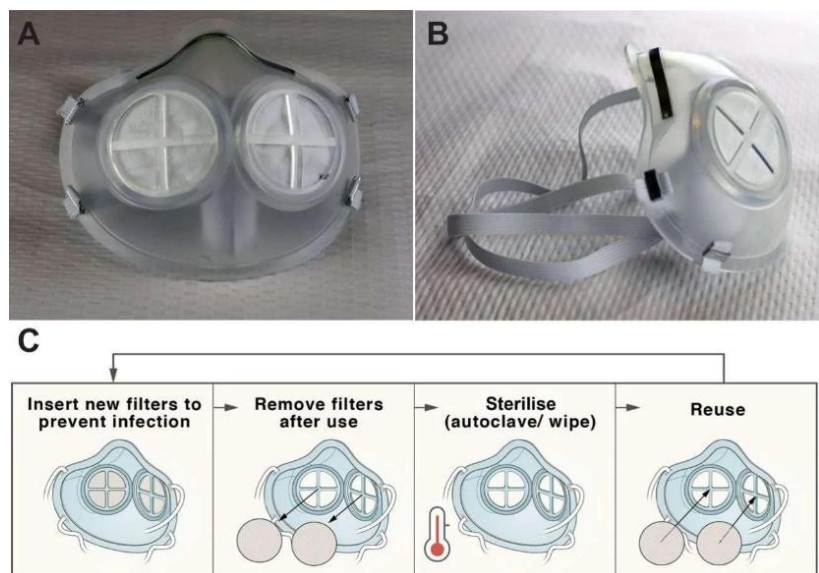


Figure 14. Facemask (Byrne et al., 2020)

Figure 15 is one of the most interesting and creative solutions to shelter problems in refugee camps. The sustainable and user-friendly ideas of this shelter are inspiring. Something to take from this visual inspiration is that solutions should be adaptable to situations, like this shelter, which can be changed in structure for warm and cold climates.



Figure 15. Innovative tent for refugee harnesses renewable energy. (Samuel Wendel, 2015)

1.6.2 Suitability

The previous visuals inspire us to make great innovative designs. All these visuals show a design that plays a role to hinder the transmission of COVID-19. They stop transmission or slow it down, which makes on-site treatment possible, and improves the general living situation.

The visualised existing initiatives bring the following solutions to the table:

- Sterile masks, more comfortable to clean masks with cleanable filters
- Separate water stations to make sure people have more distance
- Treating people with a very acute form of respiratory syndrome caused by Covid-19
- Cheap and sustainable respiratory setups and places to treat these people
- Make masks more sustainable and have a higher filtering factor
- Managing waste through biodegradable masks or other pieces of PPE
- Adaption of already existing products to solve problems

All these technologies or design elements could help refugees and raise the living standard. However, in their current form, some of these technologies are expensive and complicated, making quick production difficult, which means that the most urgent problems cannot be solved immediately. Overcrowding, limited access to clean water and washing facilities, and access to all measures of protection and medical assistance are some examples. All these urgent problems need to be fixed as soon as possible. We are convinced that the mentioned technologies contain several smaller design concepts, that could prove to be useful when creating a solution for refugees in Greece.

1.6.3 Principles and regulations

The niche that shapes our challenge is healthcare, related to COVID-19, in refugee camps. We want to shape and improve healthcare, related to COVID-19, by designing a prototype technology that hinders the transmission of COVID-19.

If there is a stable situation, like health security in terms of coronavirus, we can build on improving the general living standards in refugee camps.

Universal health is a human right, which shapes the niche that we are trying to innovate in. The WHO states that understanding health as a human right creates a legal obligation on states to ensure access to timely, acceptable, and affordable health care of appropriate quality as well as to providing for the underlying determinants of health, such as safe and potable water, sanitation, food, housing, health-related information and education, and gender equality. (WHO, 2017)

The standards used by the UNHCR, the UN refugee agency, are from the Sphere. “The Sphere Minimum Standards for Healthcare are a practical expression of the right to healthcare in humanitarian contexts. The standards are grounded in the beliefs, principles, duties, and rights declared in the Humanitarian Charter. These include the right to life with dignity, the right to protection and security, and the right to receive humanitarian assistance based on need.” (‘Sphere Handbook Health Standards’, 2019)

These SPHERE standards (UNHCR, 2020) are mostly related to living conditions in camps:

- Health service delivery. People have access to integrated quality healthcare that is safe, effective, and patient-centred.
- Healthcare workforce. People have access to healthcare workers with adequate skills at all levels of healthcare.
- Essential medicines and medical devices. People have access to essential medicines and medical devices that are safe, effective and of assured quality.
- Health financing. People have access to free priority healthcare for the duration of the crisis.
- Health information management. Healthcare is guided by evidence through the collection, analysis and use of relevant public health data.
- Prevention. People have access to healthcare and information to prevent communicable diseases.
- Surveillance, outbreak detection and early response. Surveillance and reporting systems provide early outbreak detection and early response.
- Diagnosis and case management. People have access to effective diagnosis and treatment for infectious diseases that contribute most significantly to morbidity and mortality.

- Outbreak preparedness and response. Outbreaks are adequately prepared for and controlled in a timely and effective manner.

These are some of the SPHERE standards that the UNHCR claims relate to refugee camps. (UNHCR, 2020) The low living standards at the refugee camps is an issue that needs to be addressed. The general living conditions are horrible and inhumane.

We should do everything that lies in our power to better the living standards. To design a prototype technology that hinders the transmission of COVID-19 is a good first step to stabilisation of the situation in refugee camps, so we can work on improving the living conditions in these camps in the future.

2. Deepenings



Figure 16. Ikigai (Dayman, 2020)

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2.2 Deepening table

In this deepening table all the deepenings are listed, including the planned format. Next to that, there is very short indicated why the deepening matters to the person and why it is important for the challenge. More elaboration on the deepening can be found in the next chapters.

Team Member	Deepening and Format	Why does it matter to you?	Why is it important for the design challenge?
Femke Zijderveld	The Chemistry of Biodegradable Plastics <i>Text Essay</i>	Learning if chemistry is something Femke would like to pursue in the future.	Environmental sustainability
Freek Vercammen	Product Design <i>Portfolio of research and drawings</i>	Freek dreams of becoming an inventor or creator, to attain this goal product design is essential.	Product designing
Iordan Nikolov	Virology and epidemiology of COVID-19 <i>Digital Story</i>	Iordan wants to explore the relationship between his interest in the field of astrobiology and epidemiology.	Transmission
Isaac O'Sullivan	Economics <i>Text Essay</i>	Isaac would like to learn to look at design problems from a new perspective.	Economic Sustainability
Kayla Veldkamp	Stakeholders <i>Text Essay</i>	Learning if Humanities and Social Sciences is something Kayla would like to pursue in the future.	Social Sustainability

Table 1. Deepening table.

2.2.1 Deepening Femke Zijderveld – The Chemistry of Biodegradable Plastics

2.2.1.1 Deepening and format

For my deepening, I will focus on the chemistry of biodegradable plastics. To become an expert on this, I will at least research the following themes:

- The chemical structure of different biodegradable and ‘normal’ plastics
- The chemical process of polymer (plastic) degradation
- Factors affecting biodegradation
- The production process of biodegradable plastics

2.2.1.2 Why does it matter to you?

I have always been interested in natural sciences, including chemistry. During ATLAS, I want to explore whether I would like to pursue chemistry, physics, or a combination of the two for a master’s degree and as a career. To do this, I need to get a clear understanding of the way it is taught at a university level and how it can be applied in the professional world.

During the first semester, I will be following two physics modules. However, chemistry is not covered as an ATLAS subject during the first semester. Therefore, I have chosen to focus on a theme that involves a lot of chemistry for my deepening. Doing this deepening will help me explore my own interests further. It will help me gain clarity on whether chemistry is something I would like to pursue. Furthermore, it will prepare me for any future electives in this scientific field and prepare me for a possible master’s degree in chemistry.

2.2.1.3 Why is it important for the design challenge?

For our design challenge, we will focus on COVID-19 infection prevention in refugee camps in Greece. One of our main aims is to develop a sustainable product or solution.

Many PPE, including those used in refugee camps, are currently made of plastic. Therefore, the chances are very high for our product to be at least partially made from plastic as well. Suppose we want to minimise our environmental impact. In that case, we need to be aware of the material sciences of plastics and their degradation.

This deepening will allow us to find sustainable materials for our final product and think about ways to dispose of used products so that the environmental impact is limited. Additionally, it will help us become aware of the effect our product may have on the environment.

2.2.2 Deepening Freek Vercammen – Product Design

2.2.2.1 Deepening and Format

For the semester project challenge, I am looking into the field of product design.

Product design relates to the semester project because making a prototype solution involves knowledge about how to create and what constitutes in a design. So, to have a design expert on the team would be highly beneficial.

Research topics:

- The concept and principles of universal design
- To get a better understanding of the foundations of design.
- Visual design
- How to represent a solution in such a way that everybody understands and to minimise interpretations. Drawing can be a better way to convey ideas, information and concepts.
- Design ethics of sustainability
- Sustainability is of significant importance to design nowadays. How to make something sustainable and ethic around it will make sure our design will tick all the boxes in sustainability.

I will build up a portfolio of research and drawings. Then I will look at how design principles combine with visualisation to strive for better design and better product explanation and visualisation. My final product will be a combination of written text and sketches and drawings, with an explanation of process and ideas. I will use this in the design phase of our project.

2.2.2.2 Why does it matter to you?

In the middle of my ikigai there is a dream to become an inventor or creator. Product design is one of the most important things for an inventor. It is a process that is essential if you want to solve problems by inventing physical products. The ability to understand the situation to be able to make things happen is a crucial step in the process of making something, but this is already a major part of the semester project, so I will not really address that in my deepening . The design part of problem solving, is the direction that I want to head into. That is why I am doing my deepening about product design and design visualisation.

I want to be an inventor; somebody who comes up with concepts and can design products to solve complex problems. Solving a problem (even though it is stated as a challenge) by creating a physical product (invention) is what this challenge is about. Only now the teams are pushed in the direction of problems related to COVID-19, the problem is just more specific. The general principles and ideas of design are the foundation on which this challenge is build. I will just go in broader and deeper on the design part than we will get through the lectures of the semester project.

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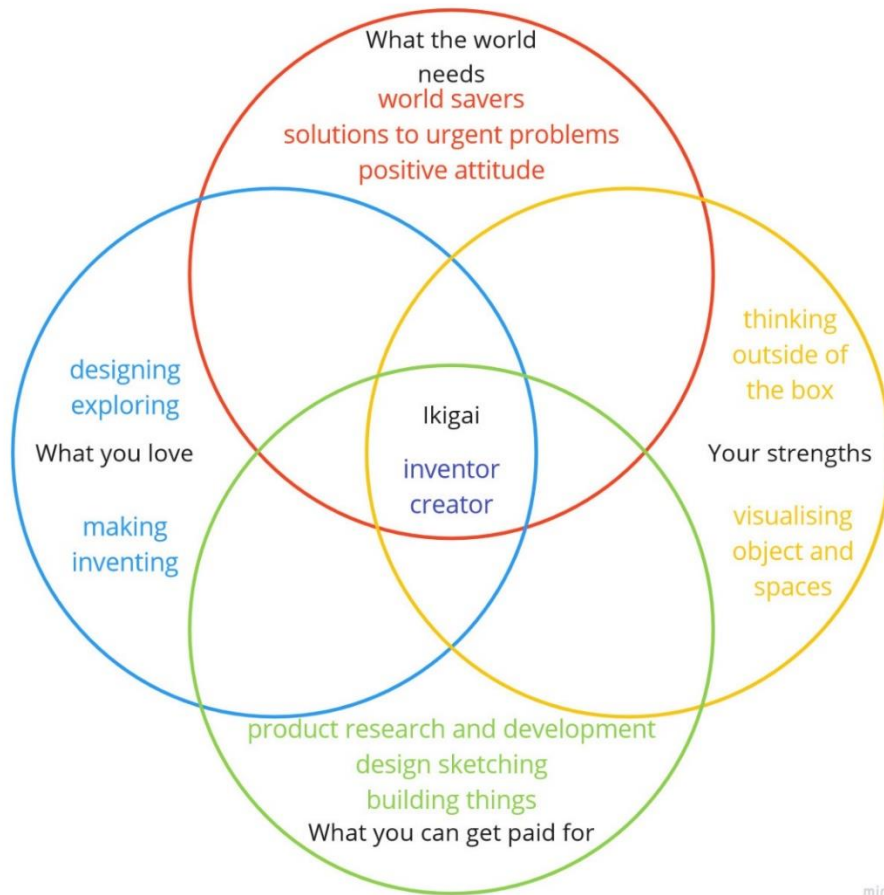


Figure 17. Ikigai of Freek.

2.2.3 Deepening Jordan Nikolov – Virology and Epidemiology of COVID-19

2.2.3.1 Deepening and Format of Presentation

Within our design challenge project, I would like to focus on the virology and epidemiology of COVID-19. For me to gain a deep understanding of these fields, I plan on researching the following topics in the beginning. They appear very important for my prior knowledge and future inspiration for further research with regards to the semester project:

- Introduction to epidemiology
- Virology and epidemiology of COVID-19
- Existing mechanism for the prevention of viral diseases
- Modelling of hindering the transmission of viral diseases
- Ethics in health crises

As this seems to be a deep specialisation in viral epidemiology, I would like to present my findings in a digital story. The advantage of my choice is that I can animate complex models and present them understandably and entertainingly.

2.2.3.2 Why does it matter to you?

This is a rather tricky question when it comes to my interests, plans for the future and passions. I enjoy, and I am very passionate about physics. I would love to work in this great domain and contribute to the global pool of useful findings in this realm of knowledge and application. What I am particularly interested in is astronomy. Yet, one would ask, why viral epidemiology then?

Astronomy and epidemiology are more closely related to each other as one would think in the first place.

Epidemiology must do a lot with mathematical modelling of complex systems - like astronomy. Geographical Information Systems (GIS) used by astronomers facilitate access to epidemiological data through visualisation of important geographical data of Earth. They may be consulted for the development of mathematical models and analysis by spatial statistics.

There is another reason why I would like to delve into this topic and gain expertise. As I have previously mentioned, I am motivated by my interest in astronomy and physics to explore the field of viral epidemiology. I consider the possibility to specialise in astrobiology, and I would love to get academic exposure to the biological and life sciences as well. I want to explore how this experience is going to shape my future career with regards to astrobiology. Therefore, I am very eager to learn more about viral epidemiology - as an important introduction to the life sciences on a broad scale - like a real astrobiologist!

2.2.3.3 Why is it important for the design challenge?

Viral epidemiology is going to be crucial in understanding the transmission of COVID-19 and how mechanisms can be developed to minimise potential outbreaks. It will further give us insight into what solutions may be plausible and successful while trying to prevent the spread of the disease. We want to design a solution that reduces the rate of infection with SARS-CoV-2 in extremely over-crowded locations where people have drastically limited options to protect themselves. Viral epidemiology is an integral part of comprehending the virus's interactions with biodegradable plastics or other materials, for instance, that can be used to create a physical solution to the problem of hindering transmission. So, this domain is of extreme value to the challenge we face.

2.2.4. Deepening Isaac O 'Sullivan - Economics

“Economics is the art to meet unlimited needs with scarce resources”

– Laurence J. Peter

2.2.4.1 Deepening and format

For my deepening, I will focus on economics. I want to deepen my understanding of the following themes:

- Macroeconomics in times of Covid-19 - is there such a thing as a health-economy trade-off?
- Recent history of the Greek economy
- The economics of a refugee crisis
- Fundraising techniques such as peer-to-peer fundraising or crowdfunding - what makes people donate money?
- Other forms of long-term funding - loans, subsidies etc.

I plan to present my findings in the form of a text essay, as I believe that this will allow for a more direct exploration of each (admittedly broad) theme.

2.2.4.2 Why does it matter to you?

The reason I chose ATLAS over another degree course is so that I could apply myself to a wide range of subjects. For me, economics has always been a topic of consistent peripheral interest. Reflecting on my Ikigai, I see a pattern in the things I love to do. I love gaining new perspectives on perceived problems. Having studied Engineering and Applied Mathematics in secondary school, I believe I have begun to look at global issues from an Engineer's perspective. It is interesting to me how an engineer and an economist can look at the same problem and draw completely different conclusions about how it should be tackled. In my exploration of what I think the world needs, I have written that the world needs to view money as a tool for good and not as a merit system or something to hoard. I think, therefore I am so interested in deepening my knowledge of Economics. It is a subject that can be used to maximize what can be done with the resources we have. I am excited by this opportunity to take a deep dive into economics, especially as I will do so with a particular objective in mind: how will this help our design solution?

2.2.4.3 Why is it important for the design challenge?

It is easy for us to be idealistic in our design. We could spend our whole semester prototyping a technology that is highly effective, aesthetically beautiful, and useless in the context of Greek refugee camps. The reason? Budget. Even if our project is not going to progress past the development phase, it would be a waste of time to design a solution that is not - at least in theory - economically viable. To achieve a design that is viable long-term, we must understand the economic situations and priorities of the refugees, as well as that of policymakers. We must also know how to fundraise effectively. I believe that, through my study of economics, I will help to optimise what is achievable with our design.

2.2.5 Deepening Kayla Veldkamp - Stakeholders

A look into the social side of our problem. Capabilities, quality of life and engagement through policymaking. Also, social sustainability is important to complete the dimensions of sustainability.

2.2.5.1 Deepening and format

My deepening will be focused on the stakeholders we are designing for. I will address different topics that are relevant to the stakeholders. I will at least investigate:

- Stakeholder analysis. How are our stakeholders, and what is their current situation?
- Social Sustainability. How is social sustainability related to sustainability?
 - What is social sustainability, and what does it mean in our context (refugee camps in Greece)?
- Quality of life
 - How does COVID-19 influence the capabilities of the stakeholders (refugees, children, volunteers, medical teams) in the refugee camps in Greece and how does this influence the quality of life?
 - How can a specific object influence the quality of life?

- Engagement. How do you make sure stakeholders are engaged with the product?
 - Policymaking. How can policymaking influence the engagement? And how can stakeholders influence policymaking?
 - Education. How can education influence engagement towards our product?

Currently I am planning to write a text essay because with all the information I will gather it will never all fit on a poster.

2.2.5.2 Why does it matter to you?

The Ikigai covers four main questions that should be asked. These questions are the following:

- What do I love?
- What am I good at?
- What can I be paid for?
- What does the world need?

During my research on the meaning of an Ikigai and while deciding if the Ikigai is something I would like to follow or dive into more profound, I realised something. I was reading about the translation of Ikigai and how that can mean two things. Firstly, it can be something that explains why life is worth living. Secondly, it can be something that makes someone's life worth living. Eckhart Tolle describes this as being and doing. Being is an inside factor; it is a feeling from inside, for example, a

happy feeling. Doing is the outside factor; it is something that gives purpose; it can be a family or a job, for example. It still is a challenging subject to figure out with the little life-experience I have. Being and doing are depending on each other to align, but it is also important that they never connect. It is crucial to keep the two separate. It should not be about comparing yourself in your doing to create a being. Being needs to give someone an example to go out and discover doing. If not, people tend to overthrow themselves with, for example, work and get the best at this to reach happiness and thus a being. This, to me, is a different concept, because nowadays both being and doing are so connected, it makes it hard for me to split them up. Tolle suggests that to find both, you first need to find small present things that are in your life right now, instead of striving for the stars right away. This is the concept I have the most difficulty with; I tend to focus too much on the future, on reaching my maximum potential, most of the times compared to others. Instead of focusing on the present time and looking at how I can build from the building blocks I have now. This leads me to that I feel like an Ikigai should mostly about the process, instead of the end goal. This why I believe my Ikigai is still unknown and can be unknown for long. There is also no problem with finding it to me, the finding of the Ikigai can lead to purpose, but it can also give building blocks to reach a new Ikigai later in life.

Before answering the questions regarding the Ikigai and why this specific deepening is important, I felt like I need to be able to fully understand the process of the Ikigai in order to fill it in and provide reasoning.

Firstly, what do I love? I love being able to discover, help, to learn new things and hear more stories every day. My doing in terms of things I love are nature, animals, and people. Secondly, what am I good at? I am good at listening, at working hard and at finding solutions. Thirdly, what can I be paid for? I can be paid for my research skills and my quick understanding and overview. Lastly, what does the world need? The world needs people that care about others, especially those who have nothing because, in times of COVID-19, most people and nations are busy saving themselves first and then start caring about others.

Why does it matter to me?

So, why does it give me purpose, or even why may it be an alignment of my being and doing for now?

Firstly, I want to figure out whether my passion might be laying within the field of social sciences and humanities, to figure this out, my deepening is the perfect opportunity. Also, caring about stakeholders gives purpose to me, because I feel like they are the ones left out in this whole story. Nations first care about their own inhabitants, but what is happening then to the people that officially are living nowhere? What is happening to those people put away in camps? Why is the life of those people so inhumane? I care about people, so I want to help them. I can do this, because of the things I am good at, especially in the field of stakeholders, I am good at finding out what their problems are. I can come up with a solution and propose this to the team. Besides that, I could get paid or valued in the team for my research skills

and overview. This will contribute to the team in a way that I know what is going on and can easily connect everything to the stakeholders. It matters to me because this is a way I can help in showing the importance of the stakeholders. Lastly, the world needs people to care about others, and I feel like this is the perfect opportunity for me to do this.

2.2.5.3 Why is it important for the design challenge?

This topic is meaningful, considering the design challenge because the stakeholders are the ones that need to use the product in the end. If they will not use the product or not use it the intended way, our solution clearly did not work for the specific problem. A stakeholder analysis is very important; it will specify the different stakeholders and bring the various difficulties they experience during COVID-19 to light.

The stakeholder analysis will help us create something that is socially sustainable. Social sustainability is important to our challenge because together with economic and environmental sustainability, it makes something sustainable. In the case of COVID-19, we will mostly be looking at the quality of life that has been lost. It is important to establish the quality of life now, during COVID-19 to see what has the biggest impact on their wellbeing. Also, when designing something, it is very relevant to know what expected influence it has on their quality of life. If this is not expected to increase enough, it might make more sense to change the solution a bit.

In the end, when there will be a product, it is important to make sure that the stakeholders will be using the product and will be using it in the correct way. To reach this goal, we need to research engagement. So, how we will make sure that the stakeholders will be using our product. This can be done by looking at policymaking. Policymaking can, for example, influence if people will use the product, by, for example, making it obligatory. Stakeholders can also influence policymaking, in such a way that they can tell what is, for example, important to them and where the money spent on them should go.

Engagement is also partly educating. People need to know how to properly use something before they will and can start using it. This means it is important to get a hold on how we can educate people in such a way.

When answering all these questions in the deepening, we will know what their problems are, which of those have the most influence on them, how our solution can make their lives better, how we can make sure they have something to say about the product, how the government can help us implement the product and how we make sure people will use it (properly). This deepening will create social sustainability and make sure our product will be a success for the people.

3. Reflection

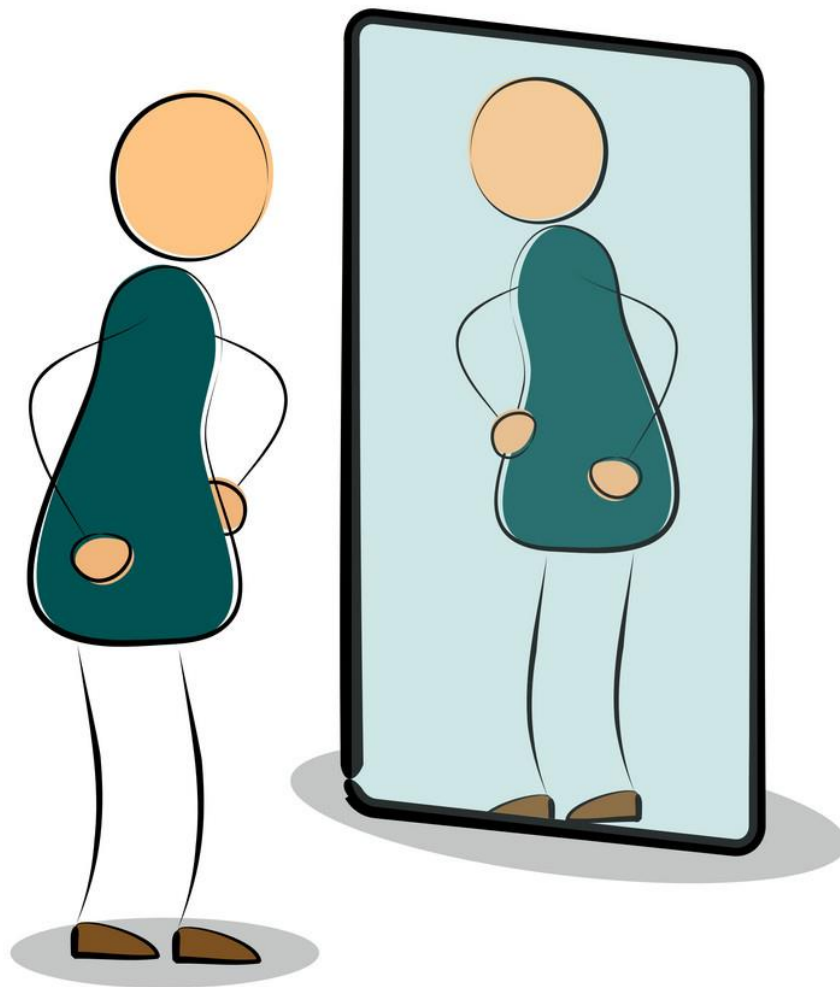


Figure 18. Reflection in the mirror (Vasutin, n.d.).

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3.1.1 Content – What are we learning?

The information from the context studies has taught us a lot about the stakeholders. We are now more aware of the problems that they face and what their situations are like. We also learned a lot about sustainability and how we can incorporate this into the design challenge.

We did a lot of research about Design Ethics and Philosophy of Technology. This has made us realise that the technology we design may have broader impacts on the community and stakeholders than what we planned for. We are now aware that we need to be very mindful about the implications of our design. We will keep this in mind during the design process. We will make sure to think ahead so that we can create an appropriate design, that is useful for individuals, and that is sustainable.

We want to hinder the transmission of COVID-19 in refugee camps in a sustainable way. While working on Deliverable A, we have realized that this is a very complex topic, so we need to incorporate information from different topics to face the design challenge properly. We, therefore, need to make sure that we have a deep understanding of the different aspects of our challenge. We have tried to align our deepening with these topics so that we can gain expertise on them.

We are happy about the way we have conducted our research and about the knowledge we have gained. In the next phase, we are going to be learning about our individual deepening, which are organic chemistry, economics, product design, stakeholders, and viral epidemiology. During the design process, we will also learn soft skills, such as presenting, cooperating and information literacy.

3.1.2 Process – How are we learning it?

When starting the project, we decided to play on each other's strengths. In practice, this means that Femke usually chairs the meetings and creates the agendas, Jordan oversees external communication, and Kayla keeps track of the deadlines. Freek and Isaac do not have such a specific position, but they always generate a lot of ideas and give a lot of input. However, these positions are not set in stone, and we make sure to be flexible about this. We do not want to limit ourselves to just one role, because the problems we face are hugely varied, and we need to be flexible to reflect that.

During this phase, we had at least two team meetings a week. During these meetings, we reflected on our process and planned for the days ahead. For every assignment and deadline, we would divide the tasks evenly and set internal deadlines. In this way, we made sure that we would finish in time for the final deadline.

Thus far, everybody has stuck to the internal deadlines, which is something we are very happy about. We also all feel like the work division was very fair; everybody approximately put in an equal amount of work. Lastly, we have also made sure to take each other's personal circumstances and schedules into account. This means that we are considerate when somebody has a personal event that makes it difficult for them to invest a lot of time.

One thing that we feel like we could have done better is defining our challenge and stakeholders. We underestimated the time this would take and therefore started too late. This resulted in some parts of our poster being too vague. After narrowing down our challenge and stakeholders, we did manage to improve this.

We are currently using different resources to address our design challenge. Our main resource now is the internet. We use academic papers, but also the websites of non-profit organizations. In addition to this, we have used the information from the project lectures.

A challenge we faced when looking for information, is that it is very difficult to find reliable information about the situation in Greek refugee camps. Much of it is unknown or communicated in an unclear manner. In addition to this, the available information, is often only available in Greek, which we are unable to read. It is, therefore, difficult for us to find reliable and useful information about this topic.

In the next few weeks, we will need to contact some organizations to find out more about the situation in Greek refugee camps, because it is difficult for us to find this information on the internet. We will also keep looking for additional resources on the internet. We will try to use peer-reviewed papers when possible and research further databases that contain current and reliable resources. This is a challenge because COVID-19 is such a recent issue.

3.1.3 Purpose – Why are we learning/doing this?

The Digital Story gave us some initial guidance towards defining our challenge and its context. The Design-Concept Poster helped us further understand the stakeholders and we feel that a lot of additional information was gained from this. However, we do not think that the time we put into the poster was proportionate to the insight we gained during this process.

For Deliverable A, we needed to do a lot of research about the context of our challenge. We feel that we now have a more in-depth understanding of the different aspects of our challenge and have a clearer perspective on the information we need to make further progress. We have had to invest a lot of time into the context study, but we think that this was worth it, because we have learned a lot.

In addition to this, we have now defined our deepenings and their relevance for ourselves and for the project. This has given us a clear perspective of what we want to research and why. We are now able to start working on our individual deepenings in an effective way.

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