

How to create and manage a voluntary Face Shield Production Group using 3D Printing

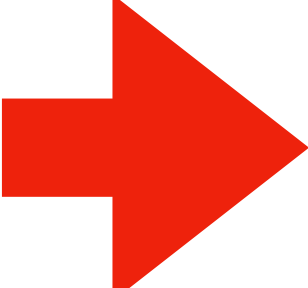
This manual was prepared based on the exchange of messages between all collaborators of the production group in Salvador, Bahia, Brazil, seeking to register what we can call the group's best practices until March 27, 2020.

THE SOURCE



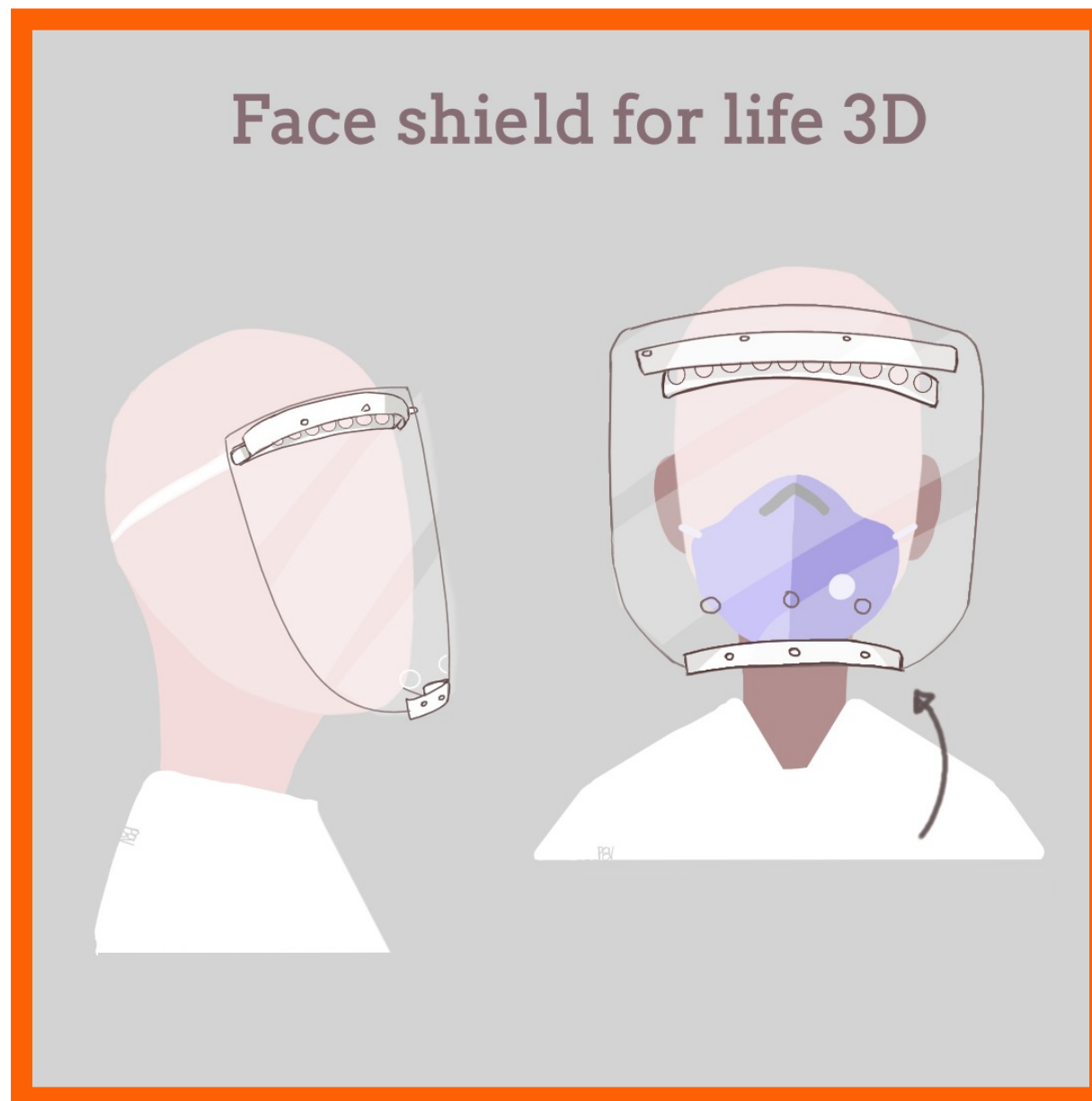
The original project was designed by PRUSA, a traditional manufacturer of 3D printers and was made available for free download.

You can access the original PRUSA project at this link: <https://www.prusaprinters.org/prints/25857-prusa-protective-face-shield-rc1/comments>

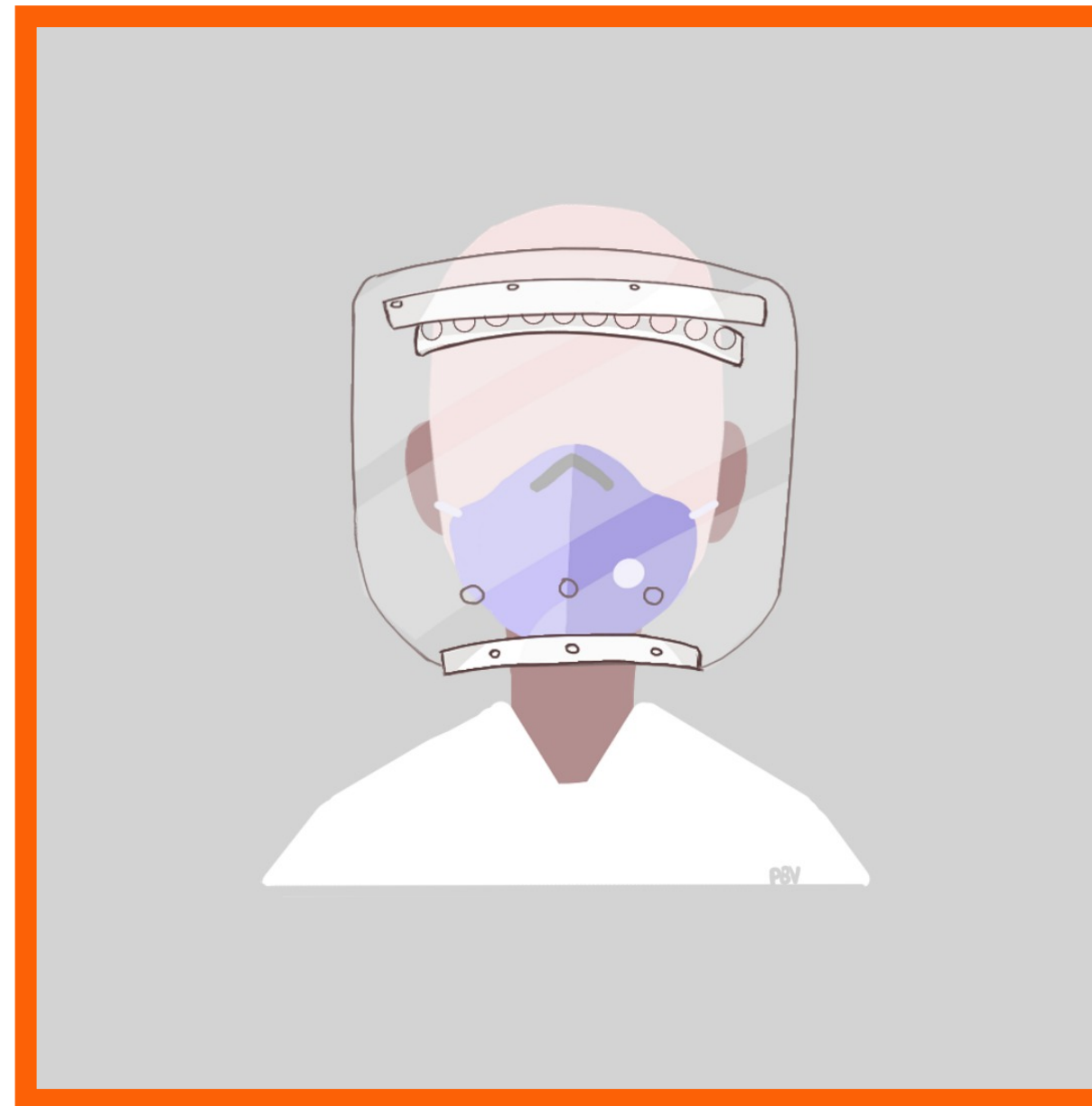
 In order to reduce the printing time, collaborators of the production group in Bahia, to which I am linked, have been redesigning the project. Until the publication of this PDF, the project in use is available for download at this link: <https://drive.google.com/drive/folders/1sUt38LVKWrALRXuec6Vr9TI1jV37JDs0>

SPECIFICATIONS

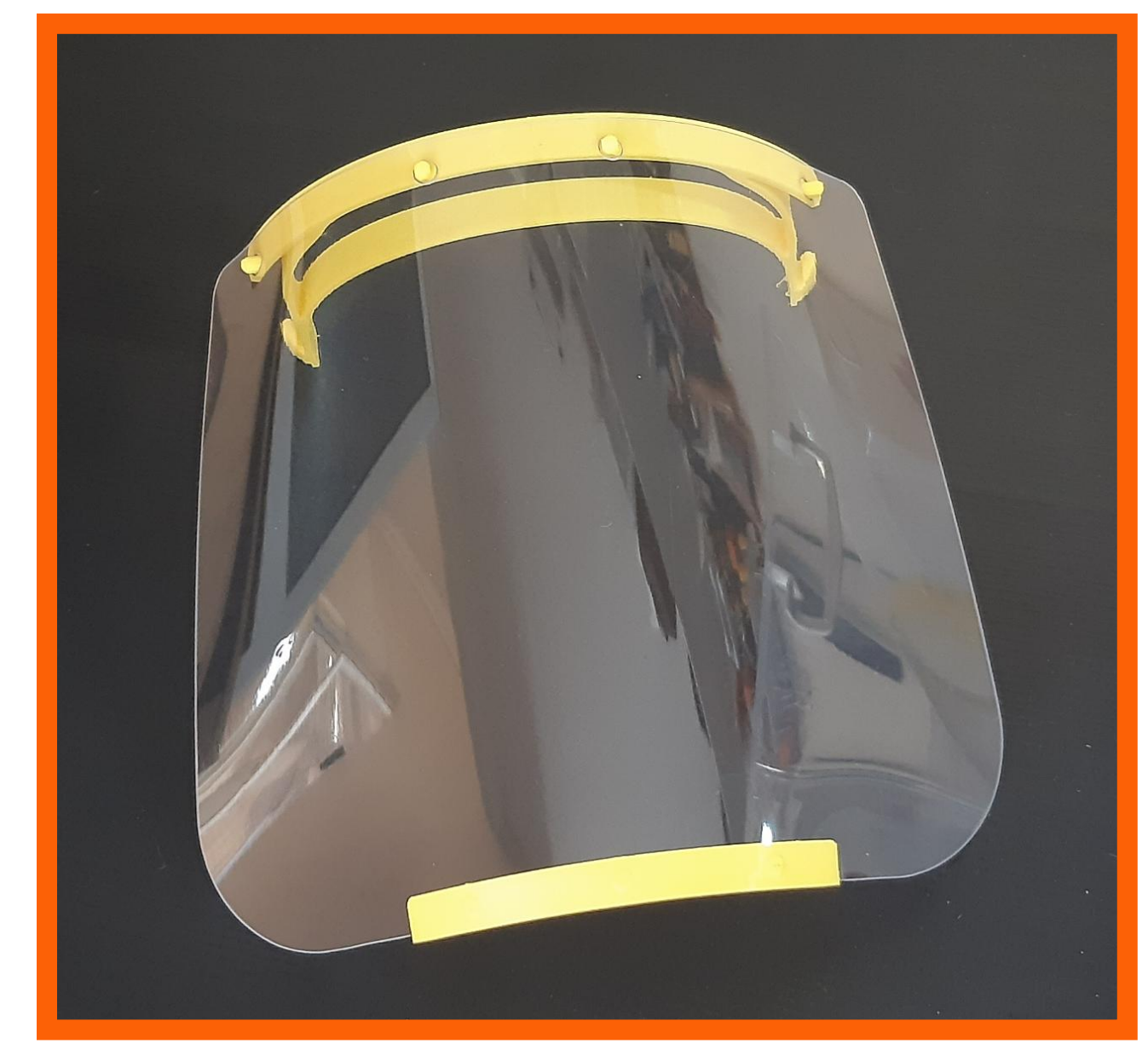
The Face Shield that we are producing here in Bahia follows specifications that fit the Brazilian standards for EPI, according to the standards established by RDC No. 356, of March 23, 2020.



FIXING ROD
10mm wide



SHIELD
Acetate thickness: 0.5mm
Dimensions: 28.5 (L) x 24.0 (H) cm



MOUNTED FACE SHIELD

Printing polymer (filament): Preferably PETG. First PLA alternative. Second ABS alternative
(some cases of allergy have been reported when using ABS)

MANAGEMENT



MANAGEMENT IS EVERYTHING!

**SEEK CONTACT SINCE FIRST MOMENT WITH YOUR
MUNICIPAL HEALTH SECRETARIAT OR HOSPITAL OR
STATE HEALTH SECRETARIAT.**

**THEY WILL SUPPORT YOU AND GUIDE HOW TO MAKE
THE PARTS REACH THE PLACES THAT NEED THE MOST.**

THIS WILL SAVE YOU TIME !!

HOW TO MAKE PRODUCTION FEASIBLE?

The work is being done entirely on a voluntary basis, however the group was concerned with the sustainability of resources so that there was no lack of resources:

- **Print filament**
- **Acetate**
- **Ribbon**
- **Fuel**

The first initiative was a crowdfunding campaign that produced capital for the first maintenance wave of the project.

Then, new adhesions from both public and private authorities produced support allowing the initiative to increase in number and speed of production.

To produce the Face Shield effectively and efficiently you will need to complete the following steps:

- 1** A group of collaborators who have **3D printers**;
- 2** A group of collaborators for **acetate cutting***, **assembly, cleaning and packaging**;
- 3** A group of collaborators to carry out the **logistics**;
- 4** A group of collaborators to **manage** the other groups and **align information**.

* Here in Bahia we got a visual communication company commitment, which is centralizing the acetate cutting process and sending it to the assembly, cleaning and packaging group. It is very worthwhile to try this alternative.

WORKFLOW

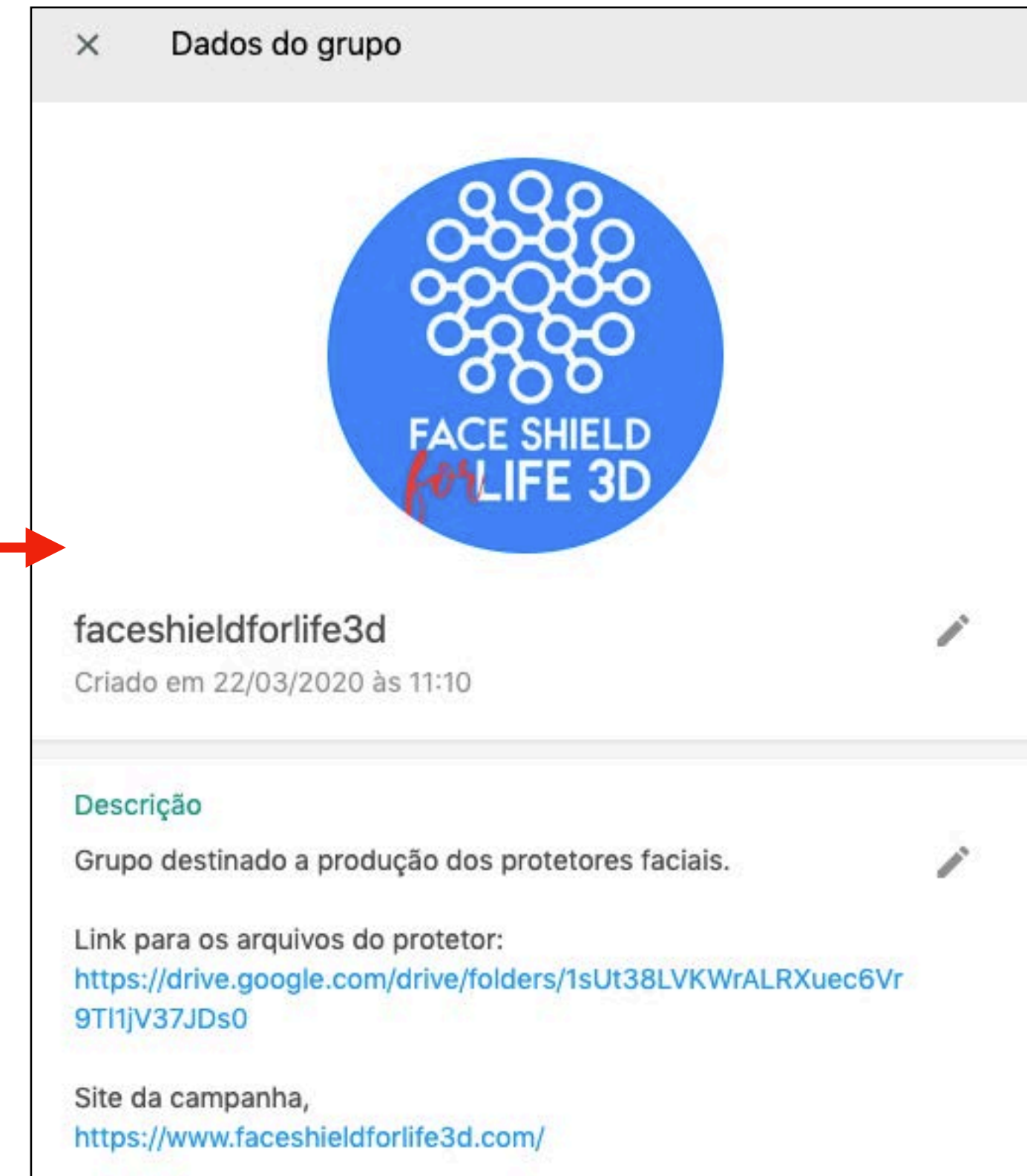


MANAGEMENT GROUP
ACTION 4

1

A group of collaborators who have **3D printers**.

1. **Organize a Whatsapp group with everyone who wants to collaborate. Start with 1 person and ask that new person to also start inviting others from your city.**
2. **Put the group description in a simple way:**
 1. **Group objective;**
 2. **Link to download project files;**
 3. **Link to management spreadsheet (model in this link: <https://docs.google.com/spreadsheets/d/180Yq5RnWIOICMI8sgWCQYuv6AtLNK7lqVS3-3Xip-Q4/edit?usp=sharing>)**
3. **Share the management spreadsheet to ONLY fill in the people who are directly related to PRINTING.**



1

A group of collaborators who have **3D printers**

TO PRINT:

- You can print using **PETG, PLA or ABS;**
- You can use either **0.4 or 0.8 nozzle. Using the 0.8 nozzle, printing is much faster;**

We all know that each printer has its peculiarities, but we are suggesting printing with the following basic parameters:

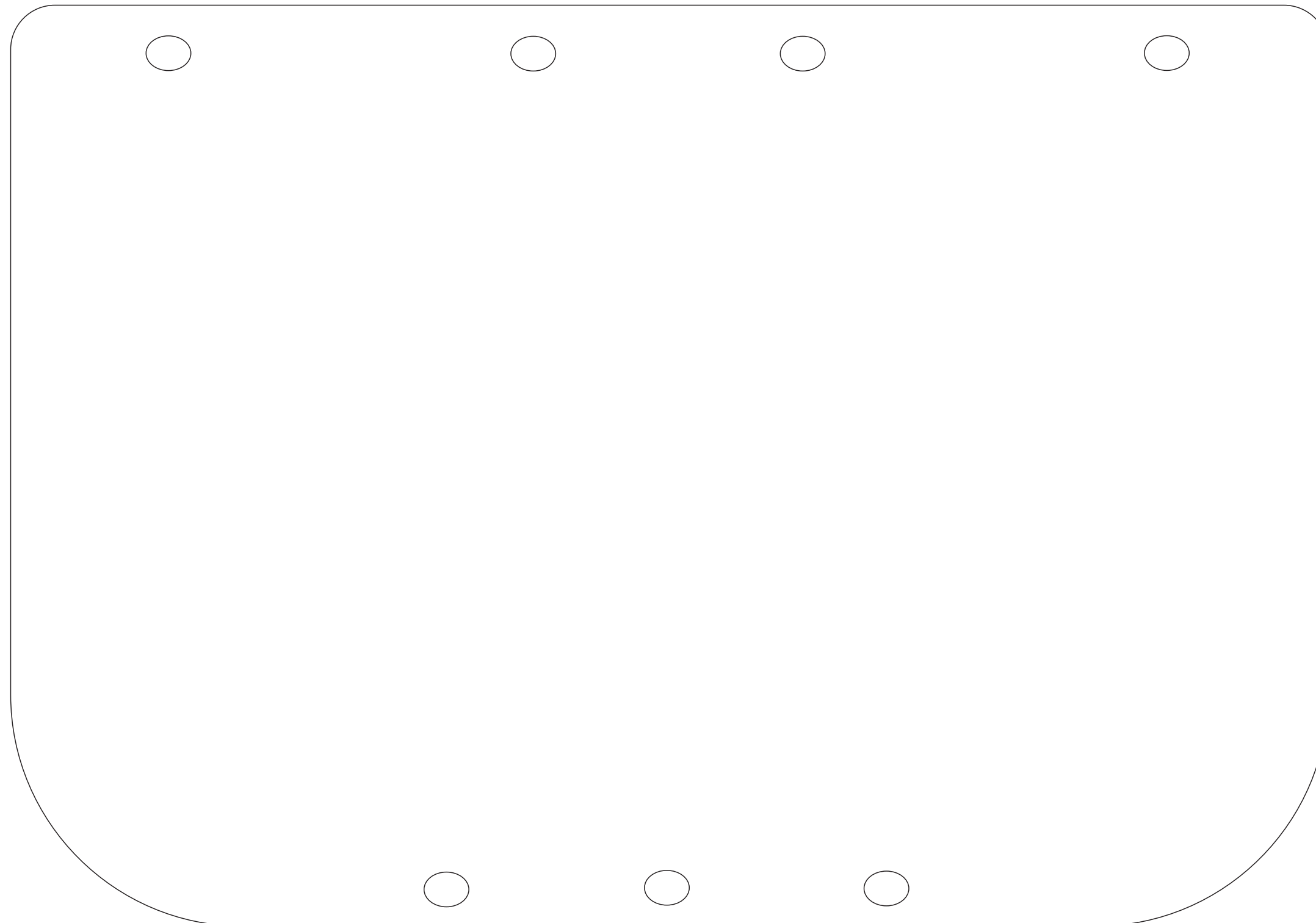
- **Layer thickness: 0,25mm**
- **Perimeters: at least 3 with 0.4 nozzle**
- **Infill: 30%**

IMPORTANT: When packing to deliver to logistics, identify the parts with the information of what material they used to print: PLA, PETG, ABS. This is very important to define the most appropriate way of cleaning procedures.

2

A group of collaborators for acetate cutting, assembly, cleaning and packaging

The layout of the acetate is compatible with the project adjusted by the Bahia group must follow this template:



Illustrative and off-scale drawing. Use the PDF at the link.

Link to download PDF: <https://drive.google.com/file/d/1mQLNNn82LoLk4004if-wgreazWsgl40N/view?usp=sharing>

“How to Assembly” video:

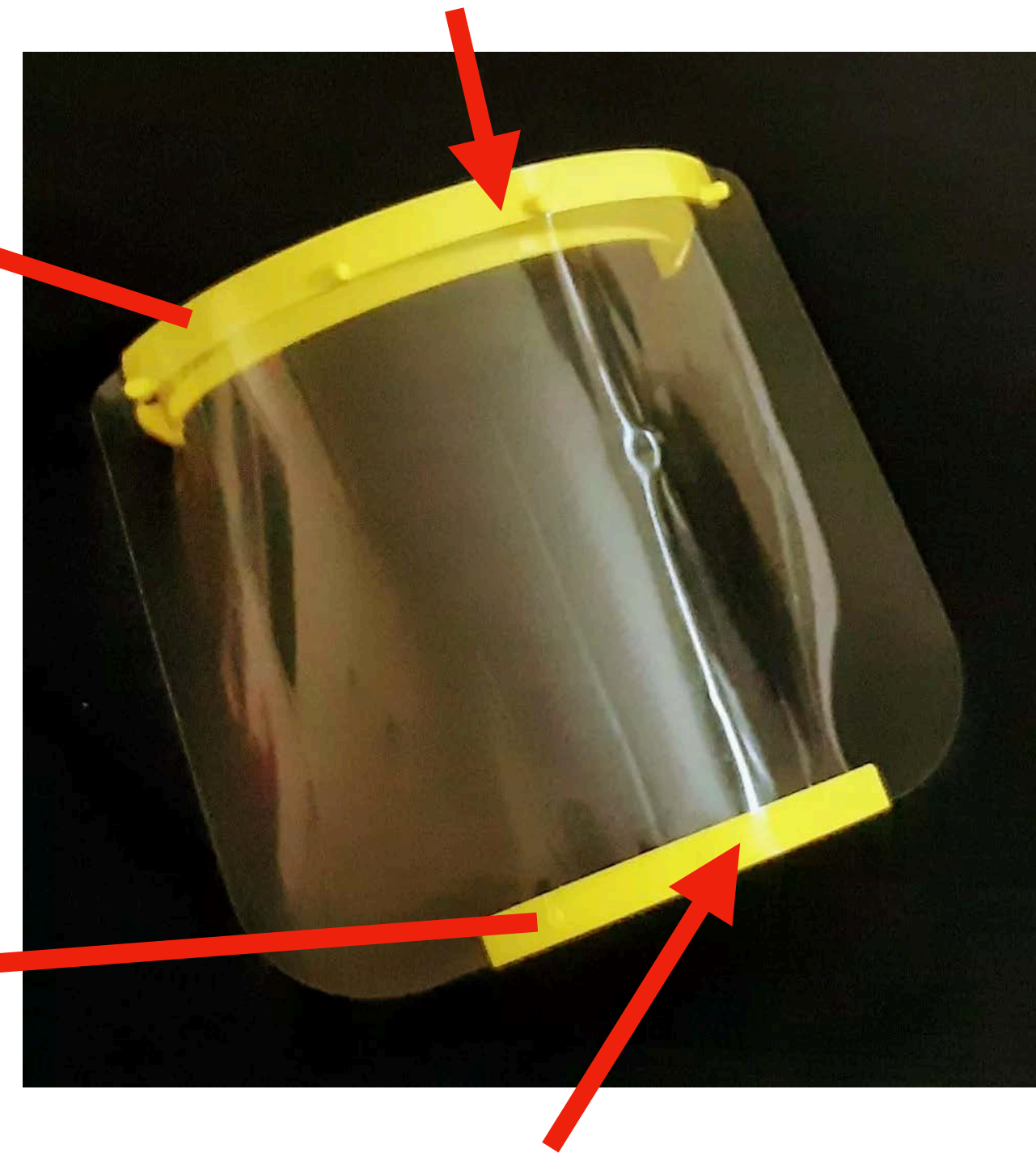
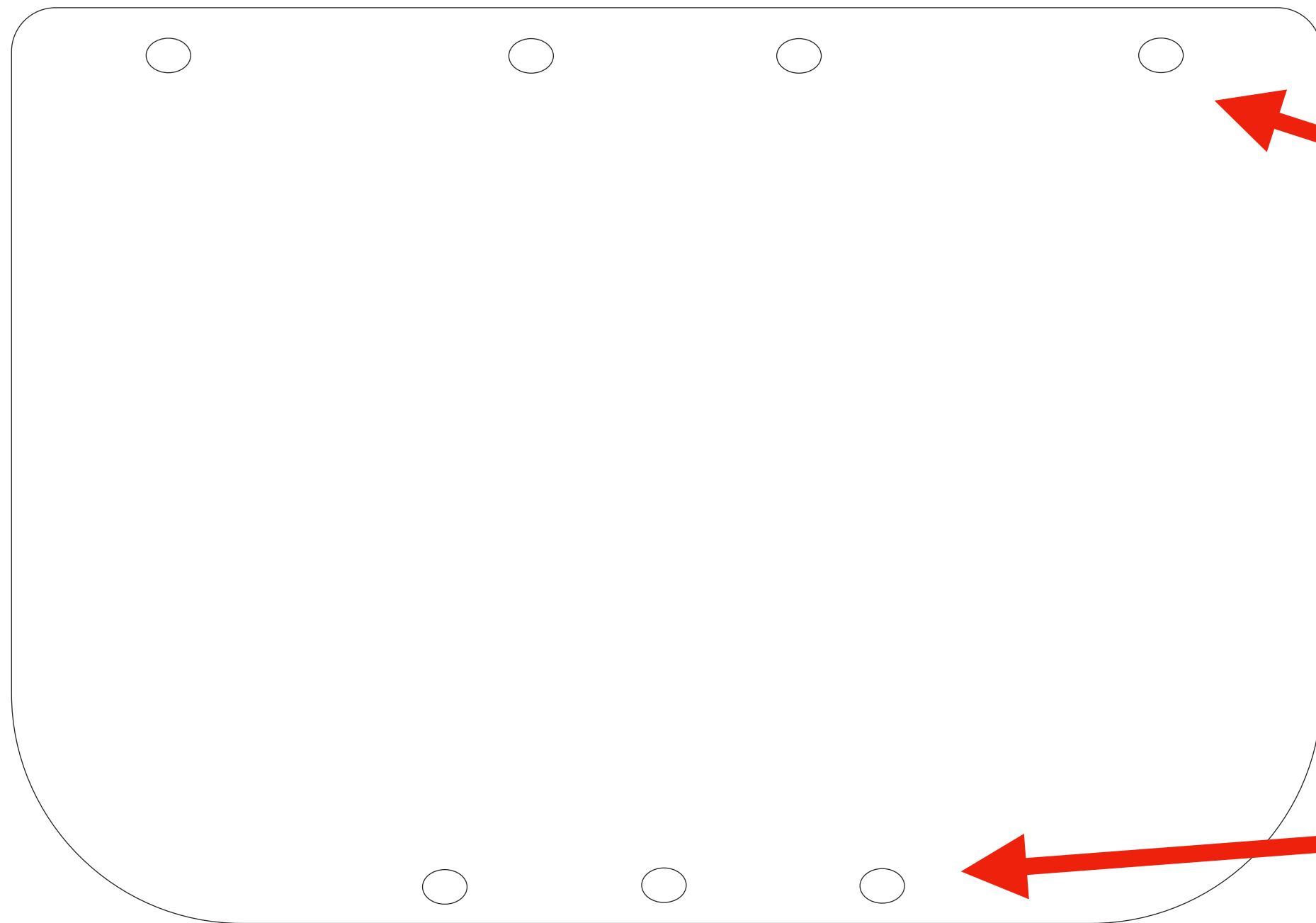
<https://www.youtube.com/watch?v=pP7z3iw76GA>

2

A group of collaborators for **acetate cutting, assembly, cleaning and packaging.**

The **assembly** is done by fitting the parts in the holes:

[Filename: Headband Facil Mask - 15 mm height - No Hex.STL](#)



[Filename: bottom_reinforcement.stl](#)



THE DETAILED ASSEMBLY MANUAL WITH ALL THE INFORMATION (FUNDAMENTAL READING !!!) IS IN THIS LINK: https://docs.google.com/document/d/1hlhC7E9YteXIXAc6Yy8eYoXel267Lt9FE_dcQM_PUh8/edit



3

A group of collaborators to carry out the **logistics**

As important as the production is to have the parts transported from the PRINTERS to the ASSEMBLERS and then to the INSTITUTION that will use the protectors.

So it is important to have the support of people with vehicles (motorbikes or cars) that can pass through the houses / companies of the printers and take them to the assemblers.

Here in Bahia, an optimized route was traced using the information collected in the management spreadsheet that we provide to make the itinerary in the shortest possible time.

Another important action is that the logistics center is replacing the filament for the printers so that production does not stop. That is, at the same time that the collectors pass to pick up the pieces, they already deliver a new spool.



IF YOU RECEIVED ANY EXTERNAL MATERIAL, LIKE FILAMENT, FOR EXAMPLE, HYGINE IT. ALWAYS OBSERVE THE RULES OF SOCIAL ISOLATION AND HYGIENE.



3

A group of collaborators to carry out the **logistics**

Here in Bahia, the Public Health Supply Department provided vehicles available to transport the parts.

In addition, the collaborators themselves are providing filament to lend to those who no longer have filament until the a new order of filament spools, made by the logistics group, arrived.

4

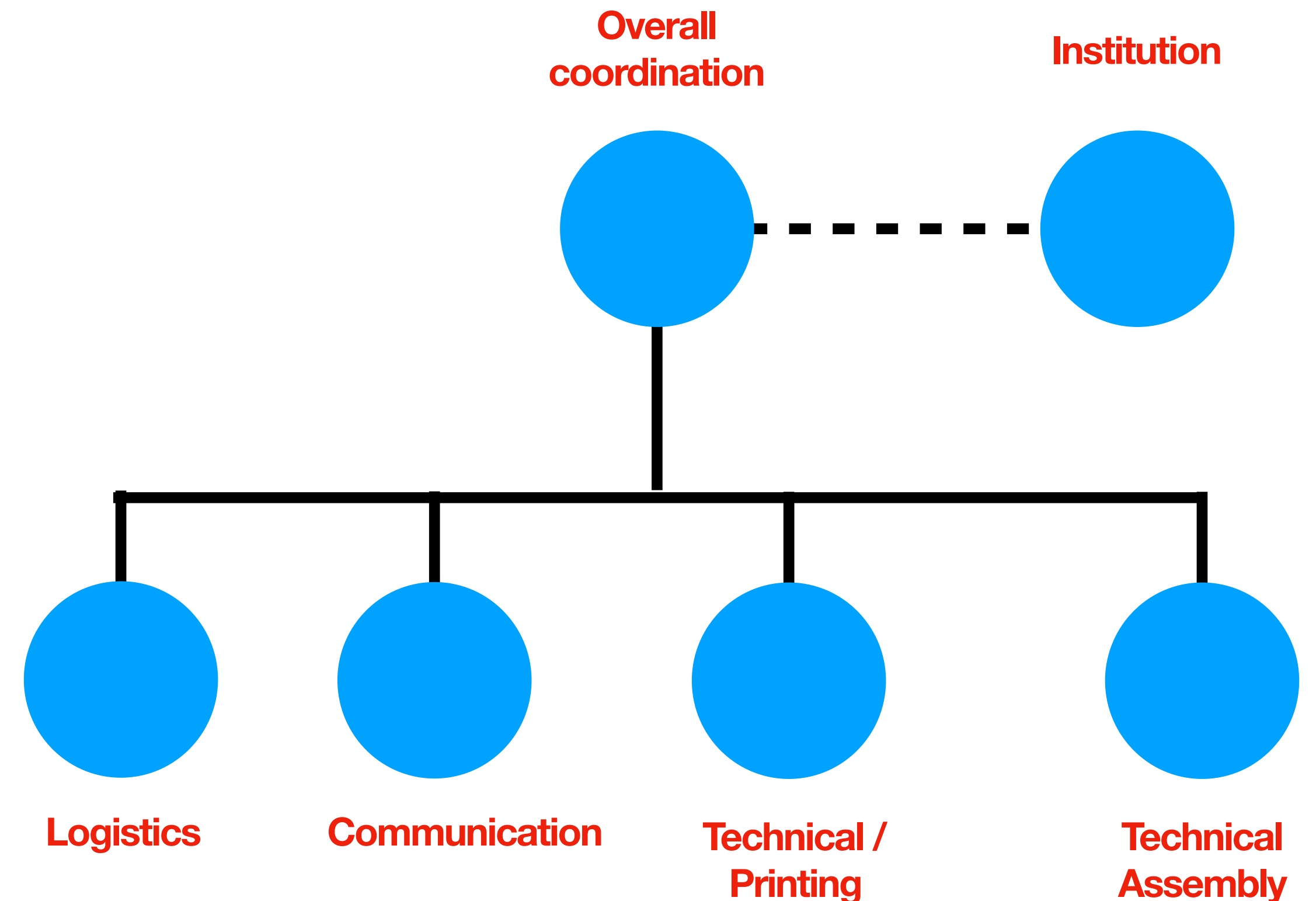
A group of collaborators to **manage** the other groups and **align** information.

General process coordination is essential;

Centralization of decisions is necessary for the group to operate in an orderly manner;

This coordinator or organising committee is also responsible for contacting the institution (health secretary, hospital, etc.);

We suggest the minimum structure on the side.



IMPORTANT: MOTIVATE YOUR GROUP AND ALWAYS ANSWER QUESTIONS. THE MORE INTERACTIONS THE MORE ENGAGEMENT.

INSTRUCTIONS FOR USE OF THE FACE SHIELD



Use in procedures involving liquids (eg bath) or a large amount of secretions / fluids (eg hemorrhage, vomiting, during the passage of central and peripheral venous access) that can generate splashes on the face.

Use in aerosol-generating procedures (eg, intubation, extubation, cardiopulmonary resuscitation, nebulization, tracheal aspiration in an open system, non-invasive ventilation).



Attention: The use of the surgical mask or N95 must be maintained, as indicated.



Disinfection instructions: Wash with water and 0.5% dishwashing detergent, followed by rinsing and immersion in hypochlorite for 1 hour (final concentration of 0.02% active chlorine), followed by rinsing, drying and packaging.

WE ARE ALL TOGETHER. WE WILL WIN!

THIS DOCUMENT IS CONSTANTLY UPDATED.

If you identify something that should be adjusted or improved send email to sangalo.alexandre@gmail.com to be incorporated into the manual.

March, 27, 2020