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OBJECTIVE FACE SHIELDS

When creativity and solidarity help health professionals

In the early days of the pandemic crisis in spring 2020, caregivers are sounding the alarm : they urgently need protective equipment.

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After a few days, engineers, physicians, researchers, students, volunteer citizens, entrepreneurs coordinated, making an offensive of creativity to design, manufacture and supply the equipment that was so unfortunately lacking.



March 2020, a unique pandemic terrified the planet : no one is prepared to that critical situation. On the front line, caregivers are under-equipped. The **Beams service of the** *Ecole polytechnique de Bruxelles*, used to collaborate with university hospitals and the **FabLab of** *ULB*, quickly coordinate with the **Michel Cremer Foundation**. Objective : to mobilize their resources and address the urgent lack of protective masks.

Conducted in a very short period, this proactive initiative illustrates how research centers, where physicians and engineers collaborate, are places beneficial to the development of innovation at the service of community.

The deployment of collective intelligence, the combination of skills and the generosity

of volunteers led to an extraordinary experience.

Moreover, while many people felt powerless and isolated in the face of this crisis, this human adventure allowed them to feel useful, to recreate the link and to contribute to a solidarity project.

THREE INTERACTING STRUCTURES

The Michel Cremer Foundation

This public utility Foundation aims to support cutting-edge research in endoscopy based on parnterships between physicians, engineers and other scientists to design innovative medical devices.

The BEAMS service

The Bio-Electro And Mechanical Systems service at the École polytechnique de Bruxelles collaborates with the Erasme University Hospital to design medical devices for minimally invasive interventions via natural pathways.

The FabLab of ULB

Organized in networks, FabLabs are «manufacturing laboratories», collaborative workshops that operate on the free sharing of knowledge and know-how. The design is developped in a global way and production is intended to be local, rapidly evolving from concept to functional prototype.





16 - 21 MARCH 2020

MISSION : IMAGINE A SOLUTION TO THE SHORTAGE OF FFP2 MASKS

The initial idea : a protective barrier in front of the entire face

While the virus is already killing at every turn, the stocks of FFP2, these two-way masks that protect both the physician wearing it and the patient, are missing.

Physicians at *hôpital Saint-Pierre*, Hospital COVID-19 reference institute, therefore suggest using a physical barrier in front of the faces of caregivers. These 'over-masks' would protect them from external projections and prevent hand-toface contact, known source of contamination. Another advantage : this system would extend the life of the too rare FFP2.

No sooner said, than done !

A team of about thirty people : engineers, architects, physicists, industrial designers, technicians or simply 'makers' with technical skills, gets to work. The medical world and all these volunteer designers from the FabLabs of Charleroi, Andenne and Brussels exchange their ideas to design plastic face shields.

Phase 2 Production at FabLab

22 - 29 MARCH 2020



TREMENDOUS CREATIVE ENERGY

This is the added value of FabLabs : their digital manufacturing tools allow to do quick and well, via 3D printing or laser cutting. The method is really efficient : a physician suggests such a design, a few hours later, he has the prototype in hand and can give feedback, which allows to quickly improve the model.

Design : a plastic sheet and a headband

Fast and efficient, this research led to the creation of three models designed in various materials to secure supplies and production. Their common point : the shield consists of a headband and an A4 transparent sheet like those used for overhead projectors.

Financing and ensuring supplies

Rapidly, the Michel Cremer Foundation released a down payment to finance the purchase of the first batches of raw materials. It contacts chemical manufacturers and develops local solutions with them. In addition, it also collects orders from hospitals and other healthcare facilities and organizes deliveries.

30 MARCH - 12 APRIL 2020 THE BUSINESS WORLD JOINS THE COLLECTIVE EFFORT

Expanded Production



As demands came in widely, FabLab prototyping machines intensively used to produce headbands were showing signs of weakness. A larger-scale production was crucial.

Timely : thanks to the media hype in the press and in social networks,

many companies answer positively to the call, making their production tools and means and/ or their logistics services available for deliveries.



Phase 3

From handicrafts to industrial production

Thursday, April 9, we send a 3D file of the laser-cut support to a Ghent company specialized in the design of plastic injection molds. Three days later, the first prototypes were released. The next day, production is launched, with the protential of producing 2.500 units daily, and this and this seven days a week !



Phase 4 Destination : the first lines MARCH - APRIL 2020

THE SUPPLY DEMANDS CAME WIDELY

Starting from design to industrial production phase took only four-weeks. Not less than 100.000 reusable face shields were delivered to the end-users.

The beneficiaries are the staff of the numerous academic and general hospitals : Saint-Pierre, Erasme, UZ Brussel, ZN Antwerpen, Bordet, Brugmann, Huderf, CHU Epicura Mons; also, throughout the country, senior facilities and nursing homes, palliative care or abortion centers, general practitioners, nurses, nursing assistants, physiotherapists, dentists, but also services to youth assistance services, municipalities, schools, nursery, CPAS, police services, jails ...

And then?

From now on, the implemented production process allows, if necessary, to produce about 30.000 daily face shields per day. As regard to the aprons and gowns, the Foundation established sustainable solutions with the guarantee of having local.raw materials and production.





Without FFP2 masks, our nurses had to work with ordinary surgical masks

In the intensive care unit, often patients develop acute renal failure. The nurse should remain at the patient's bedside for 3 hours to ensure his safety and regularly perform manipulations that expose her to blood, a source of contamination.

To protect our medical staff and patients, face shield is much more effective and practical than simple glasses when performing technical procedures ... and provides significant comfort and visibility.

> FRÉDÉRIC D. Physician Intensive Care Unit Centre Hospitalier Epicura, Baudour site

On behalf of all these colleagues, I would like to ask you to express our sincere gratitude to the team.

> **ÉTIENNE D.** Director City of Wavre

MESSAGES & TESTIMONIALS

Our compliments to the dedication and enthusiasm of all the volunteers !

> **JEF O.** Member Club Kiwanis

This faceshield reveals the expressions of our face, we are ourselves... "as before", down with the masks !

RACHEL K. SAPSE - Psycho Educational Support Service

Find more testimonials on



These face shields were a major factor that allowed us to continue our activities.

VINCIANE S. Physician Director FARES - Fonds des Affections Respiratoires ASBL ... to feel useful and at the same time make the contacts we so desperately need.

> PHILIPPE L. Architect



Hundred volunteers took turns at the FabLab, people of all ages, from all social class, worked individually at home, made deliveries across the country. Then the firm Fluxys took over ensuring deliveries throughout Belgium outside Brussels.

Individuals offered thousands of overhead projector transparencies, manufacturers supplied us with tens of thousands of face shield as well as pallets of materials. Fluxys has even duplicated our FabLab on their premises to produce mask supports. Thanks to the many volunteers who joined us for manufacturing, deliveries, ensuring contact with the applicants, providing IT support, opening doors and relaying requests to those who urgently needed it.

To find the names of all these valuable contributors, go to :





THE PROJECTS OF THE MICHEL CREMER FOUNDATION

The main objective of our research projects is to increase the general well-being of patients and reduce complications, treatments-related pain, surgical trauma ans the times of hospitalization and recovery times. These innovative projects are the result of a multidisciplinary collaboration between physicians and engineers. Obviously this research needs financial support to develop.

SOFTENDO - PROJECT

Developed by engineer Gilles Decroly, Softendo focuses on the realization of smart materials that allow complex, remotely controlled movements. A technology designed to improve the management of endoscopic-treated diseases.



Ir. GILLES DECROLY

THE PHENIX - PROJECT

Developed by engineers Orianne Bastin and Max Thulliez and Dr Alia Hadefi, the Phenix project intended to develop a new device to apply cold plasma to contact onto the digestive mucosa membranes



Ir. ORIANNE BASTIN



Dr. ALIA HADEFI

leading to the ablation of the latter. This method could treat metabolic diseases such as type 2 diabetes, "fatty liver" or diseases such as Barrett's esophagus. The research focuses on the development of the device and on the laboratory study of cellular and molecular effects when cold plasma is applied to digestive tissue.

MAGUS - PROJECT



Developed by the engineer François Huberland, the MAGUS system (MAgnetic Gastrointestinal Universal Septotome) aims to treat via natural pathways rare diseases such as diverticulum. A dozen patients have already been successfully treated with this device awarded in 2021 « Innovation of the Year Award » by ESGE (the European Society of Gastrointestinal Endoscopy).

Ir. FRANÇOIS HUBERLAND

ENDOSCOPY, A MEDICAL REVOLUTION THAT NEEDS YOUR SUPPORT

Using natural pathways, endoscopy is a minimally invasive medical practice that diagnoses or treats a range of diseases such as type 2 diabetes, obesity, "fatty liver" Nash, digestive tract cancer, the precursor stage of cirrhosis, etc all associated to significant morbidity and mortality when left untreated or suboptimally. But also to find solutions to treat diseases for which dedicated instruments are not available : rare diseases for which it represents the only chance of therapy as well as pediatric diseases.

Generating fewer complications during the procedures, endoscopic surgery performed via natural pathways reduces treatment-related pain as well as possible surgical and postoperative trauma. Offering faster recoveries and revalidations, this medicine of the future contributes to the well-being of patients, saves lives, allows wider access to healthcare and reduces health costs.

The Foundation's missions

Created in 2010 as a tribute to a world pioneer of therapeutic endoscopy and, during 22 years, head of the gastroenterology department at Erasme Hospital, the Michel Cremer Foundation's mission is to promote cutting-edge endoscopy research and share the results of these research.

For more information, visit



HOW TO SUPPORT OUR ACTIONS ?

By making a financial donation, you can really contribute to the development of new devices to serve people and promote the sharing of this technical and medical knowledge for the greatest number.

EVERY DONATION COUNTS!

Participate in our research projects and actions thanks to an online payment on http://michelcremerfoundation.eu or on account BE 35 0689 1098 6237 Any donation is deductible from $40 \in$ per year; for a donation of $40 \in$, you will recover $20 \in$ thanks to tax deductibility.



