



TEAM CB-NEATH

2018/19 CHALLENGE BASED INOVATION

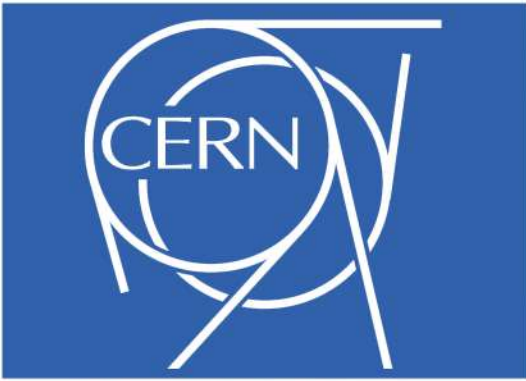
TEXTILE INDUSTRY





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ABOUT CERN AND CBI

A3 Innovation Based Challenge (CBI) is a program in partnership with CERN, which does not have the opportunity to develop projects that help design new physical or digital technologies that increase the impact of CERN's science. Interdisciplinary teams, study design students and field students, put together and learn a number of innovative design methods that can help with project design.

THE CHALLENGE

Relate the Sustainable Development Objectives with CERN technology using various methods of innovation and design to propose new physical or digital applications that aim to increase the impact of CERN science.

THE EXPERIENCE

Our trip to CERN was an intense experience that contributed greatly to the evolution of our project.

After dozens of approaches to current problems these two weeks of work and idealization culminated in the birth of an idea impelled by the desire to help improve the quality of life in our area of residence.



6 CLEAN WATER AND SANITATION



ONU SUSTAINABLE GOALS

The Sustainable Development Goals are the blueprint to achieve a better and more sustainable future for all. They address the global challenges we face, including those related to poverty, inequality, climate, environmental degradation, prosperity, and peace and justice. The Goals interconnect and in order to leave no one behind, it is important that we achieve each Goal and target by 2030.

Our team is working with two of this objectives which are:

Goal 6: Clean Water and Sanitation

- Clean, accessible water for all is an essential part of the world we want to live in and there is sufficient fresh water on the planet to achieve this. However, due to bad economics or poor infrastructure, millions of people including children die every year from diseases associated with inadequate water supply, sanitation and hygiene.

Goal 14: Life Below Water

-The world's oceans – their temperature, chemistry, currents and life – drive global systems that make the Earth habitable for humankind. Our rainwater, drinking water, weather, climate, coastlines, much of our food, and even the oxygen in the air we breathe, are all ultimately provided and regulated by the sea. Throughout history, oceans and seas have been vital conduits for trade and transportation.



14 LIFE BELOW WATER





KNOWLEDGE TRANSFER - CERN

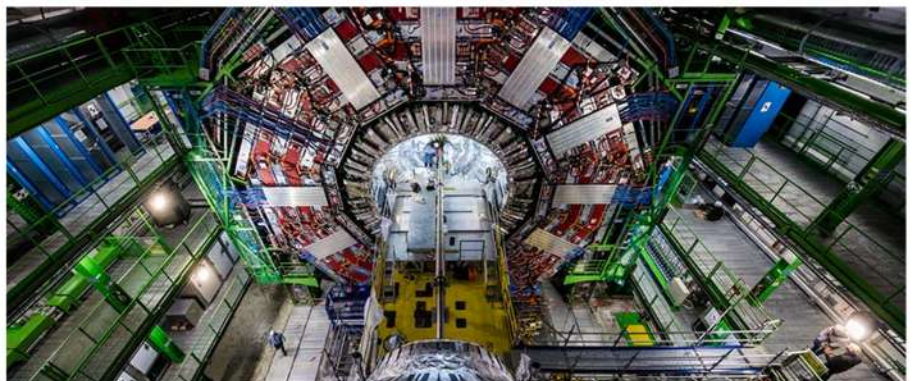
CERN's technical expertise and most innovative technologies are available for scientific and commercial purposes through a variety of technology transfer opportunities.

Our visit to IdeaSquare (CERN) was aimed at getting in touch with the technologies that CERN makes available for commercial use. The European Organization for Nuclear Research develops technological solutions for its nuclear research. Often, these technologies can have endless applications, and that's where we come in. Our aim is to find out what other applications have the CERN findings, more particularly to address the UN development goals.

Source: <https://www.portoglobalhub.ipp.pt/educacao/a3-cbi>

TECHNOLOGIES THAT WE ARE INTERESTED

At this moment our interest is focused on the cleaning of the river water and also on the monitozation of its quality. Therefore, we are particularly interested in the technology of sensing and filtration of liquid waste.







TEXTILE POLLUTION

The textile industry is one of the biggest polluters on the planet. Textile mills generate one-fifth of the world's industrial water pollution and use 20,000 chemicals, many of them carcinogenic, to make clothes. Chinese textile factories alone produce about three billion tons of soot—air pollution linked to respiratory and heart disease—every year by burning coal for energy. Most of the world's textile factories are in developing countries where governments can't keep pace with the industry's massive pollution footprint.

AVE RIVER VILA DO CONDE, PORTUGAL

The CBI presented us with the challenge of solving one of the most challenging problems faced in the world, the preservation of underwater life and water in general. As a starting point we chose Rio Ave to start our research. Our objective is to identify the impact of the industry in this river and from there develop solutions to restore the quality of this watercourse.

40 years ago this river was known by locals as the perfect place to take a bath in the summer days. Nowadays the water that passes through it is polluted by the innumerable industries that over 30 years have settled next to him.





COLLECTED WATER SAMPLES

In the month of March 2019 we collected water samples from various river points with the help of GRAQ (team of researchers from ISEP).

Alongside industrial zones we observed an increase in pH, dissolved oxygen, nitrates, phosphorus and total solids. Along with areas where agriculture is more prevalent we have obtained an increase in thermotolerant coliforms and nitrates.

WHAT WE FOUND

These results are quite scientific and require more intensive analysis to understand what is impacting the ecosystem.

But one thing is certain, with these first results we can say with certainty that the river is being polluted by both industry and agriculture.





COLLECTION POINTS

Initially, we selected 29 points for the collection of samples from the Rio Ave river. After contacting GRAQ we obtained information that it would be necessary to shorten the number of collection points in order to accelerate the process of analysis.

We chose 5 critical points:

1. River mouth
2. Old river beach
3. Zone of intensive agriculture
4. Trofa Industrial Zone
5. Santo Tirso River Beach

Interestingly, we discovered a water treatment plant next to point 5, an area with a river beach. At this point, the results indicate a high amount of fecal califorms, groups of bacteria that indicates contamination.

These bacteria support a temperature higher than 40 °C, live in symbiosis with humans, cattle, cats, pigs and other warm-blooded animals.

We conclude that, although we look for industrial pollution, we find that sewage pollution is also prevalent in this river. In this way, we will adapt our investigation to these two cases.





OUR PROTOTYPE

After our visit to CERN and some weeks of intense investigation, we conclude that the industry expenses a lot of money in cleaning water residues. Our objective is to solve that problem and encourage a more sustainable solution.

At this time we are working in a water evaporation system through the vacuum. If we put a cup with water inside an isolated system and remove all the air to inside, we evaporate the water at the environmental temperature, always depending on the applied negative pressure.

We are currently investigating whether this solution is feasible both in terms of efficiency and energy.





OUR MAIN GOAL

Our main objective with this project is to create a solution that will make the rivers in Portugal, and in the world, return to the normal parameters that they presented to 40 years ago.

Unfortunately, the more we study the subject the more problems we discover. Recently, after analyzing the water quality of the river, we find that the agriculture sector also contributes heavily to its pollution.

In addition, pollution by citizens is also constricting. At the bottom of the river we find tires and plastics. Therefore, it is not just about industry but also about raising people's awareness of this problem.

We want to create an economically viable solution for the industry, something that captivates both the companies and users of this river.

NOW IMAGINE A WORLD...

where there is no pollution of the rivers and can take a dip in any river on a summer Sunday.





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