



Smart Waste Logistics

Case study :
Town of Genoa



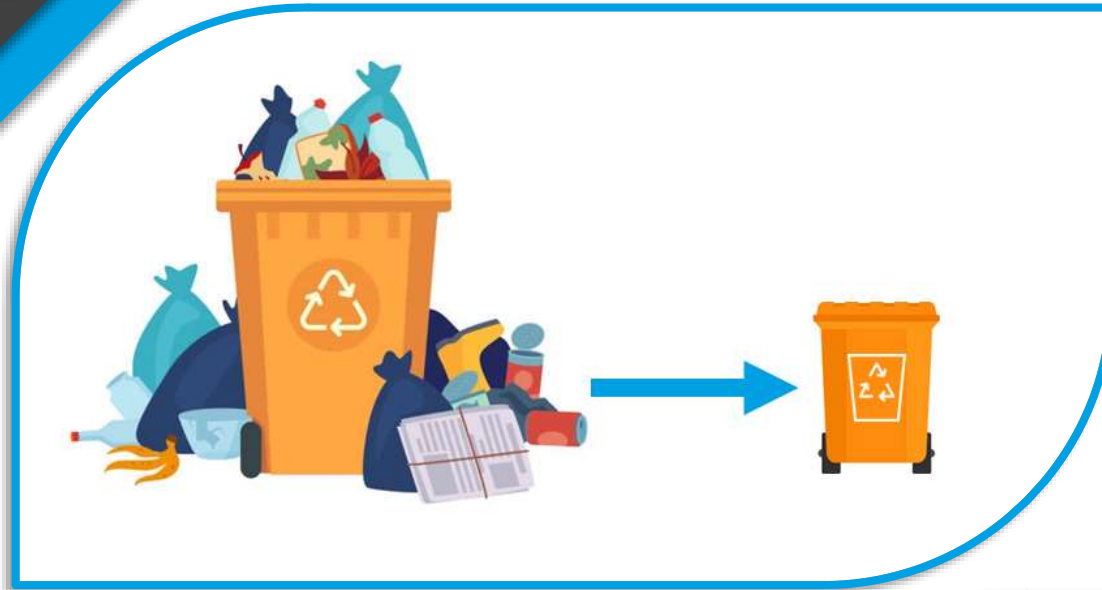


Global context

- **Waste management** is responsible for **3 %** of Europe's greenhouse gas **emissions**; part of these emissions are due to collection and transportation logistics.

- **Waste collection** is still **sub-optimized** and **inefficient**, affecting the environment and urban decency
- **Plastic** and **aluminum** wastes have a bulk density up to **6 times lower** than that of other wastes





Possible solutions

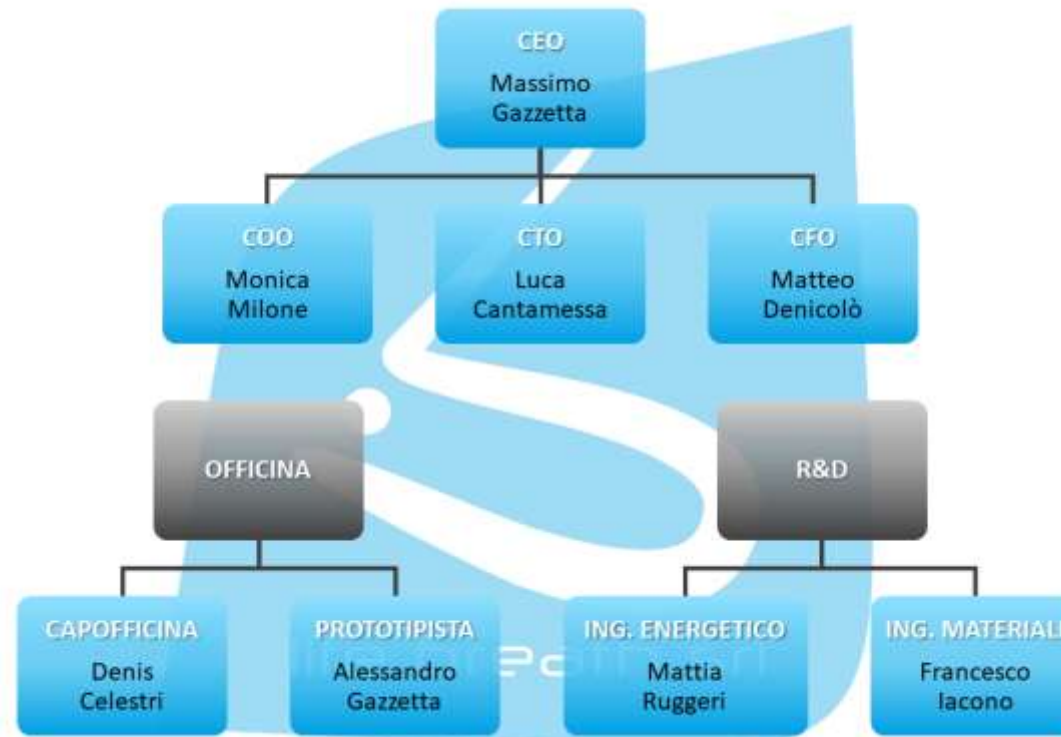
- **Reduce the volume** of plastic and aluminum waste directly where it is generated

- Collection containers with **filling sensors** and connected to the **cloud** for real-time communications
- **Artificial intelligence** that can **predict** fill-ups and malfunctions





The Life Breath team



From design...

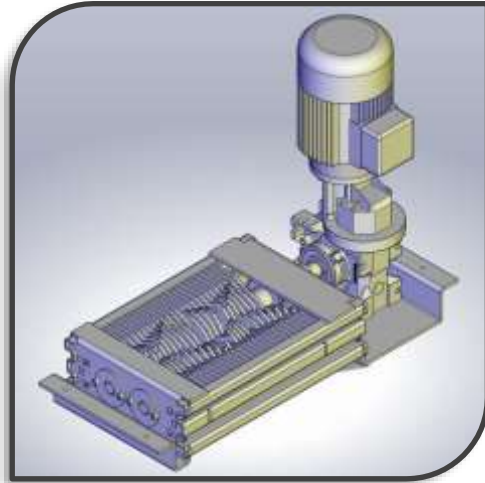


...to the implementation





The starting project: our Shredders Suite



- Life Breath was founded as a start-up in the field of circular economy
- To fit into the context just described, a line of shredders for plastics and aluminum materials was designed that, can reduce the volume by up to 80 percent
- Our products are designed both for use in private homes (Sharky) and for public use (Shark and Tarrabah)



Sharky



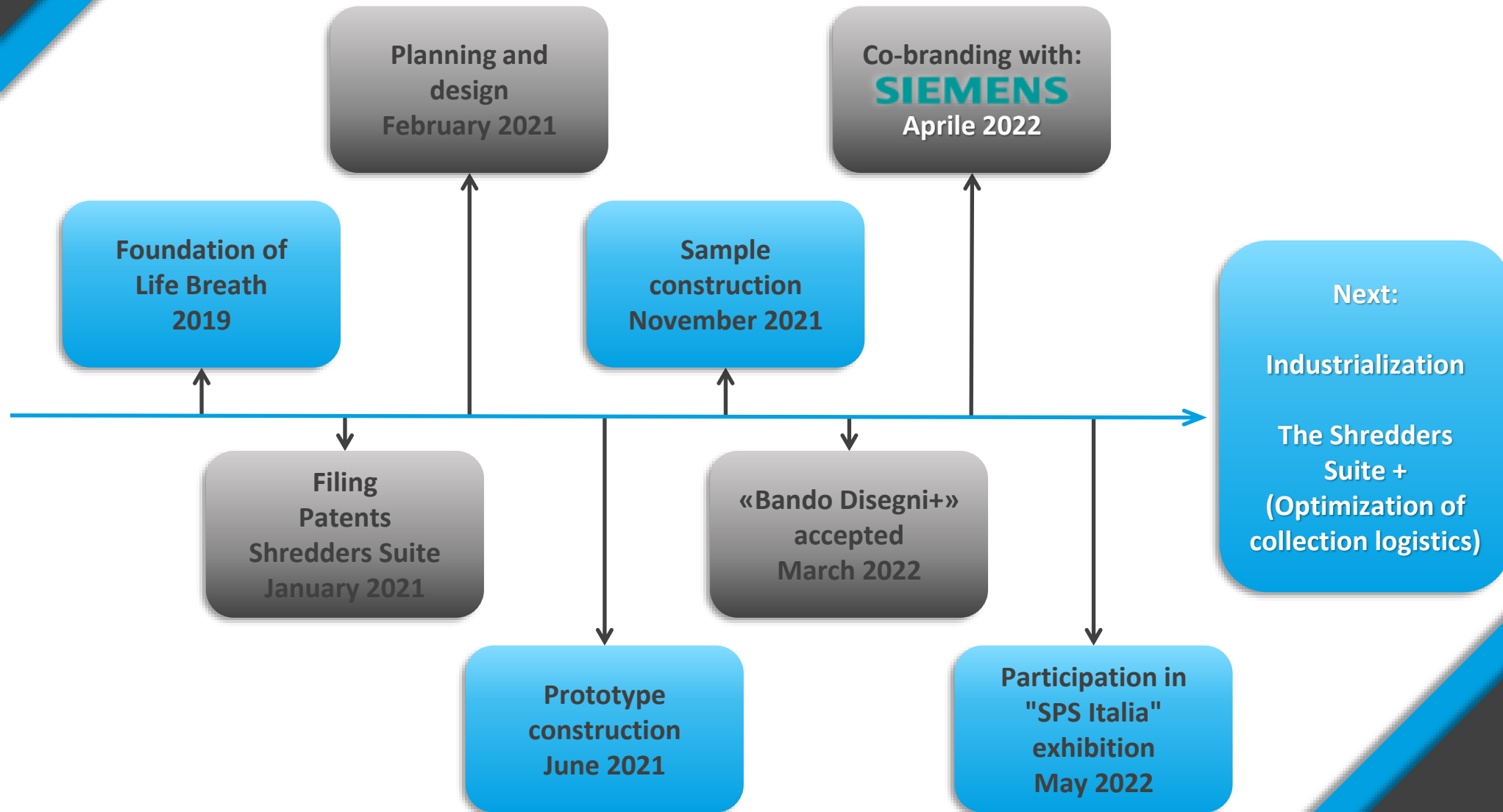
Shark



Tarrabah



Pathway and results of the Shredders Suite





Case study: Genoa

The city and the institutions



- Genoa was chosen as an in-depth case study because of several peculiarities that fit our project perfectly.
- The historic center of Genoa is characterized by narrow, winding alleys that make waste collection operations even more complex; these conditions are perfectly suited to a project that can reduce the volume of waste.
- The company that manages waste collection and transportation in the municipality of Genoa has among its goals to reduce CO2 emissions through optimization of collection logistics, which is the main goal of our project.





Case study: Genoa

The spaces and initiatives



- Within the historic center there are more than twenty "ecopoints" to which citizens bring their sorted waste, these places would be perfect for the installation of our machines.
- Access to the ecopoints is through electronic badges, technology already implemented on our products for their opening.
- The algorithm capable of calculating the amount of material processed based on the energy consumption of our shredders could integrate perfectly with existing initiatives in Genoa such as "PlasTiPremia" or the payment of waste tax based on the waste produced.





Smart Waste Logistics

hardware

Shark



Tarrabah



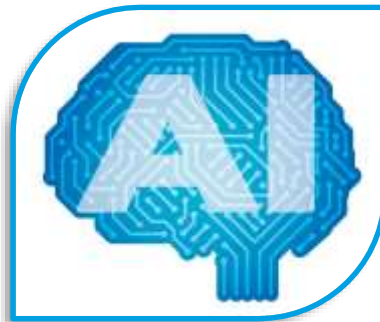
- Two different types of shredders were considered for application in the Genoa area, both of which reduce the volume of plastic, tin or aluminum materials by up to 80 percent, this feature goes perfectly with combined collection of these materials in the same containers in the Genoa municipality.
- **Shark** is designed to be integrated with the recycling collection bins already present at ecopoints in Genoa. It will be possible to place bins inside Shark that will be used to collect the processed material. The waste will be placed in a counter that is electronically managed through identification badges. Shark will be equipped with a screen for user interface.
- **Tarrabah**, on the other hand, is designed for use in public spaces and open to the public. It has an appealing design (about 170 cm high) and its own collection containers. This device will also be equipped with a barcode reader to distinguish the type of waste and open only the necessary door, improving the quality of recycling collection in public and tourist places. The large side space can be used as an advertising carrier for tourism, cultural events or environmental awareness.



Smart Waste Logistics software



- On the software side, the shredders will be equipped with different sensors to monitor the filling degree and machine performance. The different machines will send real-time data to the cloud.
- The data collected from the cloud will have two functions :
 - ✓ First will be to alert in real time the organizations involved in emptying and maintenance, indicating through an interactive map the geographical location and the necessary intervention.



- ✓ Second, this data will be used to train an artificial intelligence (AI) that will be developed to predict and communicate in advance when collection compartments need to be emptied.



Innovation and integration



- reducing the volume of waste is a step that happens in any case since it greatly simplifies its management, we want to bring this benefit as close as possible to the user.
- Thanks to the reduction in the volume of waste, it will be possible to use simpler collection vehicles without compactor modules, in case compaction is still required this would be less energy intensive, as the energy needed for compaction is inversely proportional to the lump size.
- Nell'ottica di «industria 4.0» e grazie all'intelligenza artificiale sarà possibile fornire una manutenzione predittiva, che permetterà il lavoro di manutenzione in perfetta sinergia tra gli enti che installeranno le nostre macchine e la nostra azienda.



- The reduced need for operations to empty collection containers will generate a shift in the professional figures required: from collection operators to more specialized positions such as maintenance and management figures. This will ensure that no jobs are lost and create a system that is more attractive to young people and more resilient to future crises.



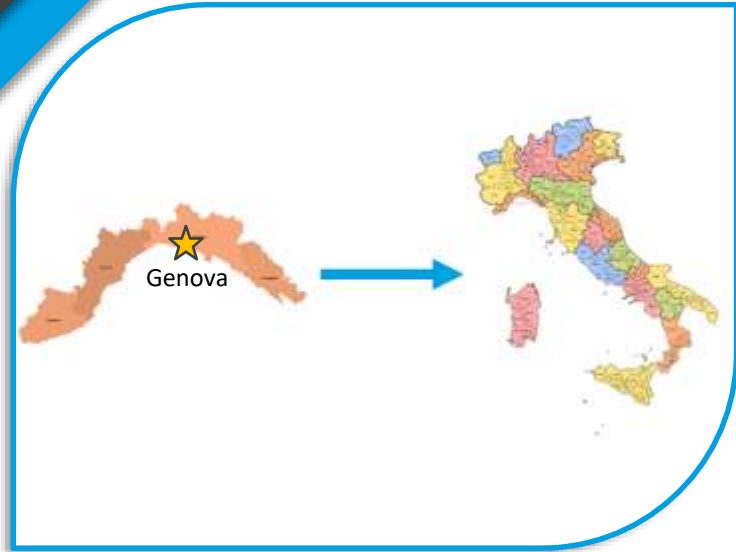
Goals and expected impacts



- The main objective of this project is the optimization of collection logistics, a minimum guaranteed result based on literature and experimental evidence is a reduction of at least 50 % of visits to empty containers at the locations where our shredders have been installed, this result consequently leads to an equal reduction in CO₂ emissions and costs associated with the purchase of fuels.
- Other benefits that citizens will experience will be related to a more livable city by reducing traffic, noise, local pollution, and costs to the community; there will also be an increase in urban decorum and the quality of recycling collection through user empowerment.
- The image of the city of Genoa will also benefit from these positive effects.



Upcoming developments



- Our aspiration is to find a city, which could be Genoa, and make it the starting point for a logistics mode that can spread throughout the country, thanks to the project's very high replicability.
- The data collected in the cloud will be used for artificial intelligence training, which will enable us to provide a service of increasing quality over time. Following the closure of the project, our company will continue to provide maintenance services and software upgrades.



- Some opportunities for future developments of this project involve the possibility, through the use of GPS on the collection vehicles, to manage the routes of the collection agency's vehicles in real time and to insert fill sensors in traditional bins as well to further improve the process of real-time optimization of collection logistics.



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