



# Productivity and Sustainability: Bringing Balance to the Steel Industry with Industry 4.0

Uncover the secret behind an efficient production line that also prioritizes protecting the environment. IHM Stefanini turned this concept into a reality, delivering astonishing results for our partner client.

## ① Who is the Customer?

One of the largest steel companies in Brazil.

With a global presence, the company is a major player in the production of long steel, operating throughout the steel production chain, from the production of raw materials to the manufacturing and distribution of final products.

## 2 Context and Challenges

Sintering is a fundamental process in the steel industry that involves the combination of iron ore fines and other materials into pellets or sinter, which are used as raw materials in steel production. However, this process also presents several economic and environmental challenges, including:

- High electricity consumption because the sintering process is energy-intensive, leading to high electricity consumption;
- Emissions of air pollutants during the sintering, including fine particles (PM<sub>2.5</sub>), sulfur oxides (SO<sub>x</sub>), and nitrogen oxides (NO<sub>x</sub>), which contribute to air pollution and the formation of smog, negatively impacting air quality and the health of local populations; and
- Waste generation such as ashes and slag, which need to be managed properly as inadequate disposal can result in soil and water contamination, posing further environmental risks.

Addressing these challenges is crucial for the steel industry to improve its sustainability, reduce environmental impact, and ensure compliance with regulations related to air quality and waste management.

The steel industry is inherently a traditional and complex sector, where introducing technological innovations can be challenging due to technical constraints, high required investments, and the need to ensure product integrity.

It is in this context that Industry 4.0 plays a transformative and disruptive role in overcoming these barriers to innovation, keeping the steel sector up-to-date despite the heavy and complex nature of this industry. Industry 4.0 refers to the adoption of digital technologies and connectivity to optimize processes, improve efficiency, enhance quality, and enable more informed decision-making. It offers solutions to long-standing challenges in the industry by leveraging data, automation, and smart technologies to drive sustainable improvements.

### 3 Business Pain Points – Environmental Concerns and Financial Losses

#### 1 Context



Particulates, or particulate matter, are very fine particles of solids or liquids suspended in the air, originating from the industrial steel sintering process.



These particles are regulated by air exposure limits established by environmental and health agencies. However, the measurement of particulate emissions occurs only after the emissions are already underway in the industrial process.

#### 2 Problems

##### Barriers in Measurement:



1

**Lack of visibility into approaching the emissions limit:** This leads to a reduction or temporary shutdown of production to avoid exceeding the limit established by regulatory authorities.

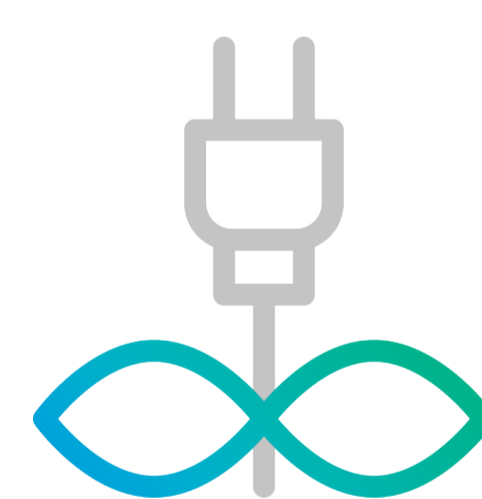
2

**High financial cost or lack of sensors:** Some pollutants do not have specific sensors, or the available sensors come at a high cost. Due to the harsh industrial process, sensor maintenance becomes difficult, leading to frequent damage and necessary replacements.

#### Consequences



Exorbitant financial losses caused by the reduction or complete shutdown of production during certain periods to avoid exceeding the emission limit.

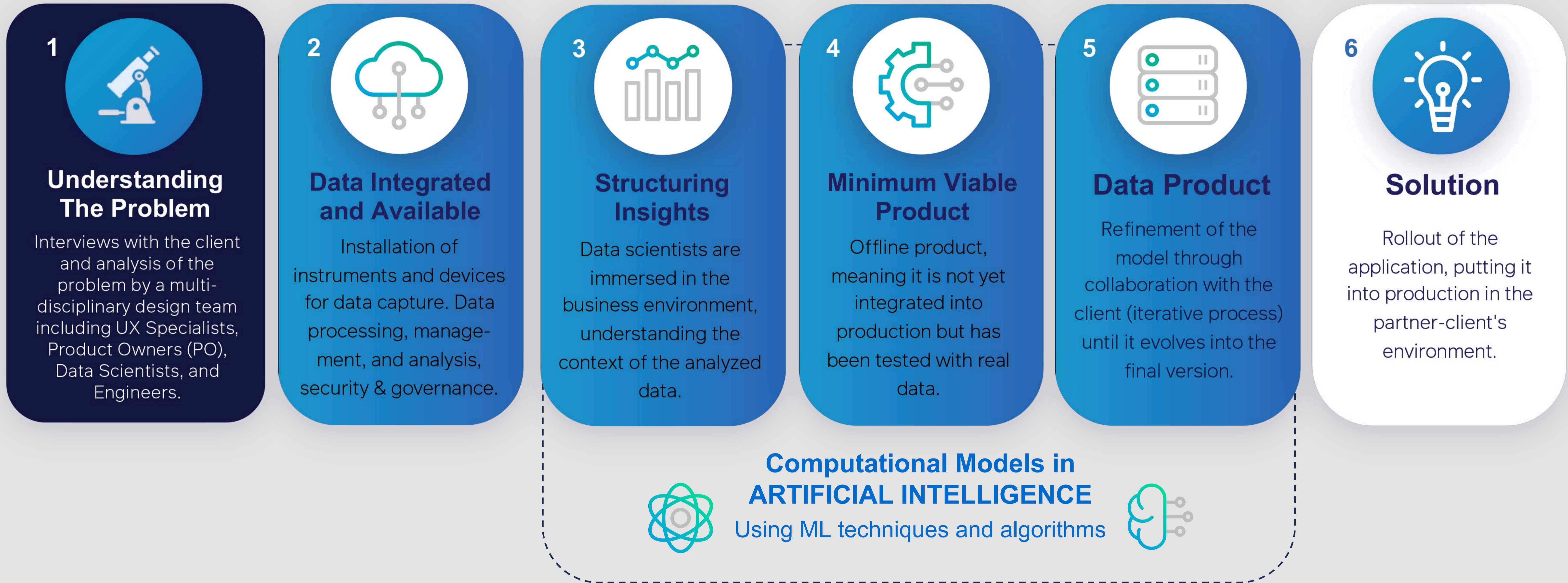



Negative environmental and health impact (affecting the surrounding community) when excessive emissions occur.



Strict regulatory processes resulting in expensive fines or damage to the company's brand image when emissions exceed the limit.

## 4 Project Overview – Approach and Co-Creation Journey

**Co-creation**  
Stefanini and Client

**Throughout the development process, ensuring a fully customized solution** tailored to the client's specific needs.

### Implemented Solution



A solution that gives operators **PREVENTATIVE CONTROL** and **PRECISE MONITORING** of the variables within the industrial process.

**Alert**

**30 Minutes**

In Advance, the operator is **notified** if there is a trend toward emitting pollutants beyond the limit.



**Performance**

Adequate time for **early action**, adjusting process variables, controlling the operation, and mitigating potential environmental risks.



**Dashboards**



Developed **specifically** for the operator's environment.



**Differential**  
Stefanini and Client

**Understanding the Business**  
(Industrial Environment)

**+**

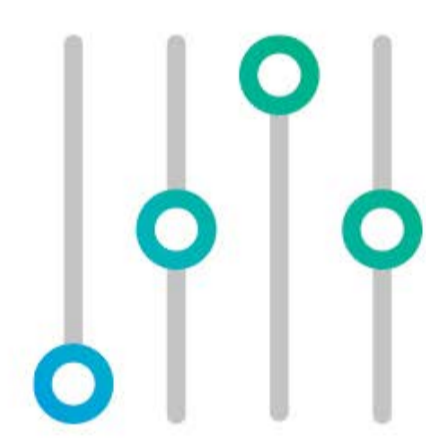
**Technical Expertise**



## 5 Results and Business Impact

**Millions**

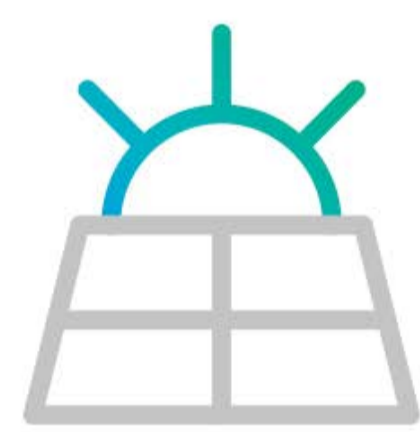
Saved by avoiding production shutdowns and regulatory fines.



Greater operational efficiency due to increased stability and predictability.



Initiative and positive exposure in ESG within the market.



Reduction of pollution, leading to improvement in the well-being of surrounding communities



Better risk management and a reduction in environmental fines.