Remote and Continuous Data Analysis

For critical assets

Candidato:
Damiano Gianotti
Relatore:
Prof. Enrico Bini
Controrelatore:
Prof.ssa Rosa Meo
Correlatore:
Prof. Yves Van Ingelgem

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Introduction

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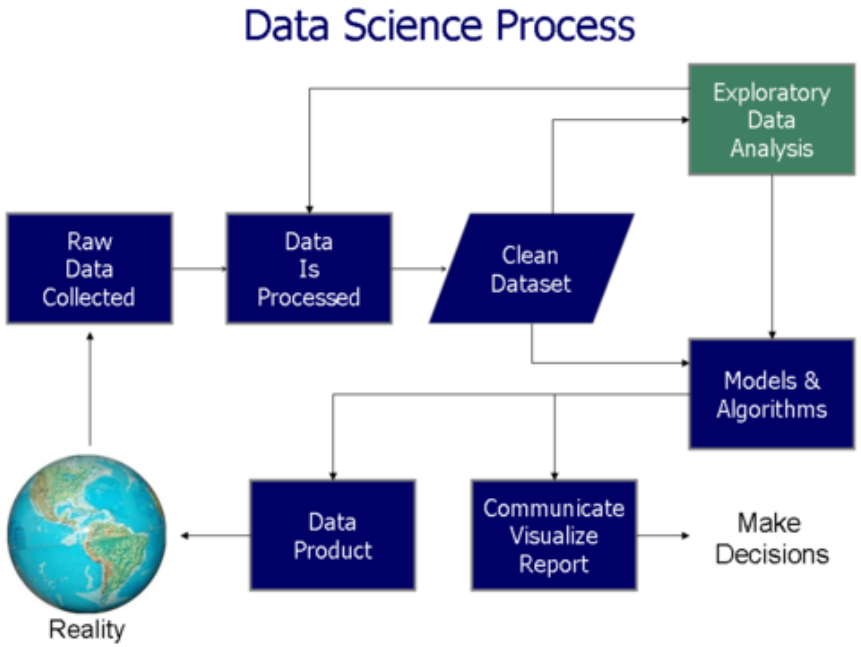
Data analysis

- Process of breaking down a whole into its constituent parts for closer evaluation.



Data analysis

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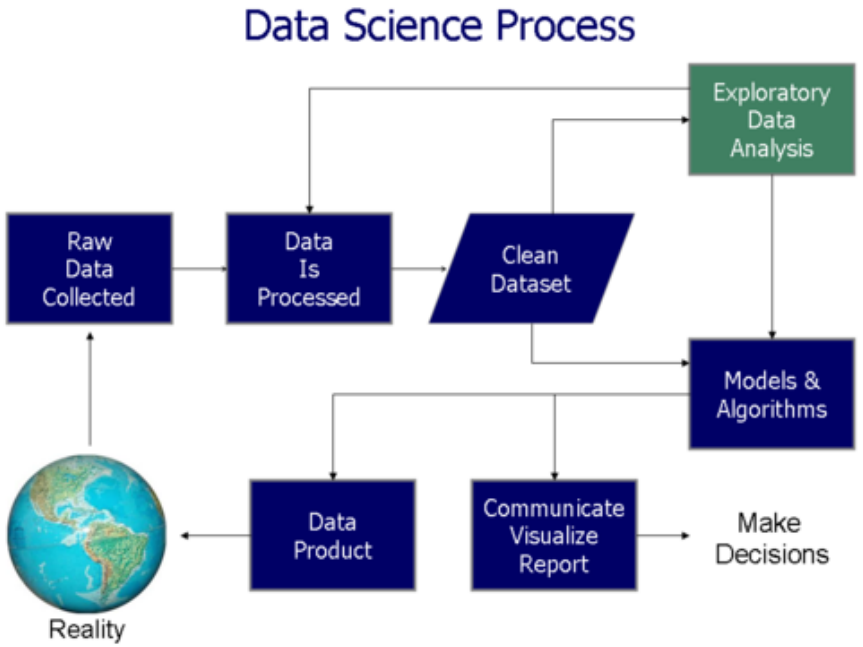
- Has several dimensions and approaches, including a wide range of techniques known by various names and applied in a variety of business, science, and social science sector



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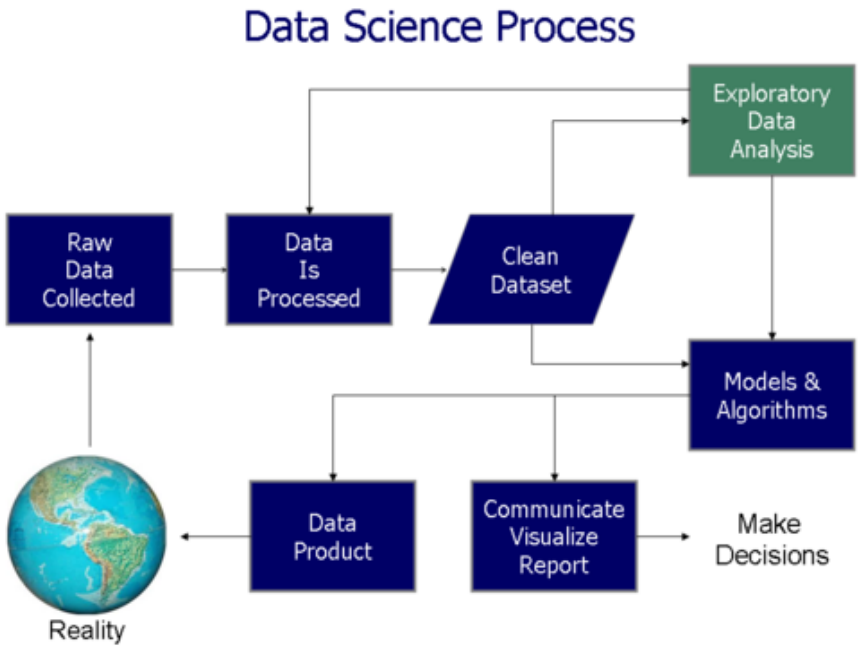
- Connection to the scientific method



Operational environment: Maintenance

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  3. Condition-based maintenance: *maintenance when it is needed*

Host: Zensor

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Zensor

Quick Overview

Based in Brussels, Belgium. Main focus is IoT and Industry 4.0.

Provide a full, integrated, and intelligent monitoring solutions for:

- Industrial Production (Food, Glass, Metal)
- Infrastructure (Rail, Tram, Bridges)
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zensor.

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Four aspect are involved:

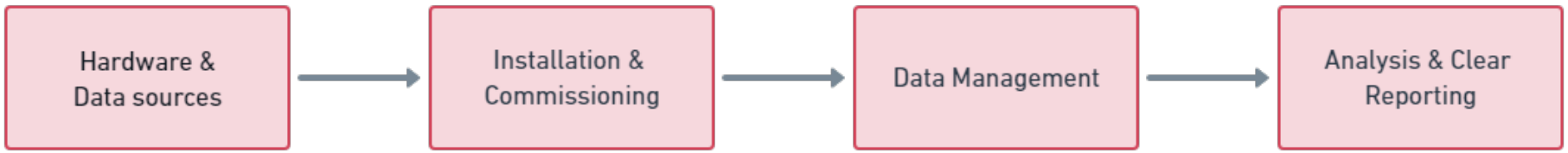

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Figure 1: Project building blocks

Core Service

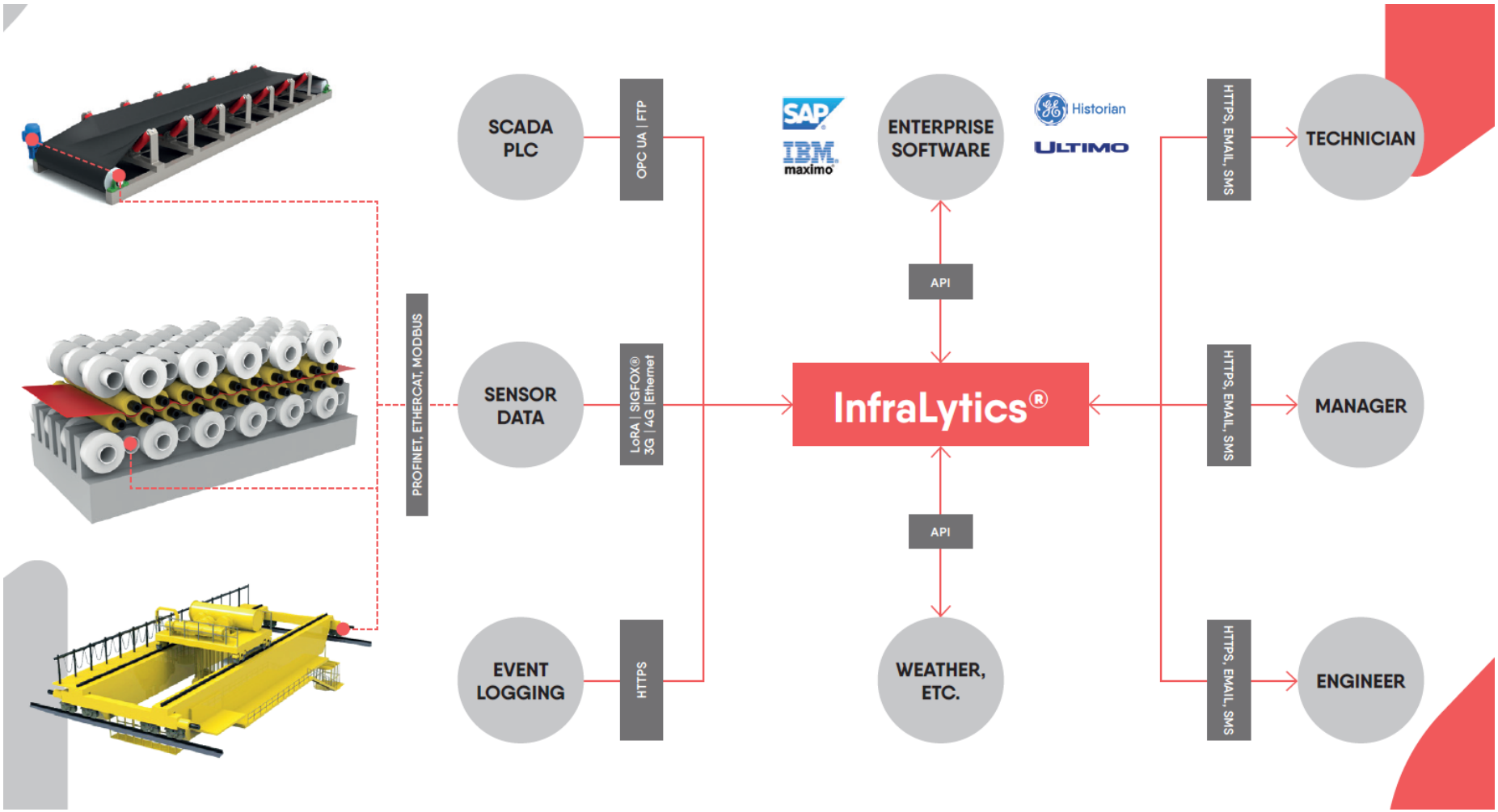


Figure 2: Infrastructure Analytics platform

Tools

Pandas

- Data processing & cleaning
- Python library, widley adopted
- *Split-Apply-Combine* approach

InfluxDB

- Data storage & warehouse
- Key-value – Time Series Database
- Data that represent how a system changes (over time)

Grafana

- Data exploration & visualization
- Web-based interactive app
- Dashboard development

Blade grinder vibration

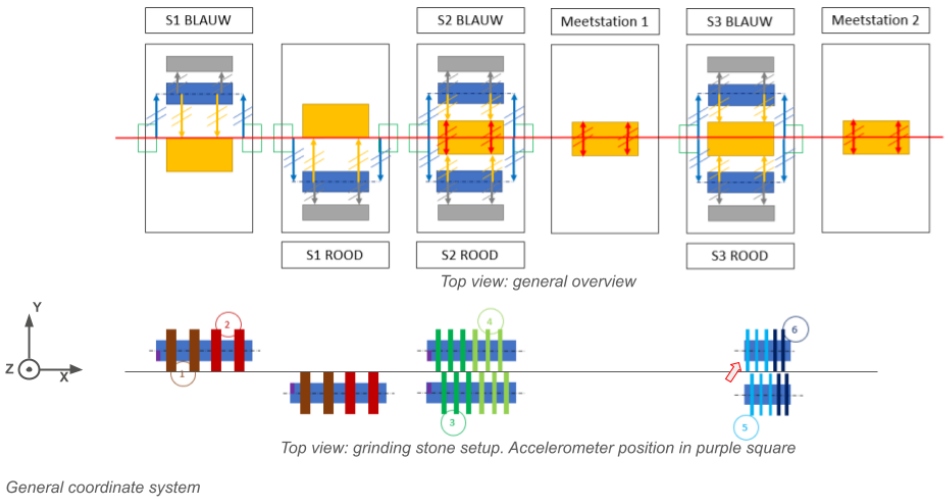
Intro & Goals

Improve blade-cutting machine line; has a high number of standstills and not ideal quality of the cut.

General goals:

- Increase production quality
- Avoid unplanned standstill & extend machines's life
- Identify the impact of the grindstones turning
- Find the root-cause of strong vibration

(a) Line overview: side view

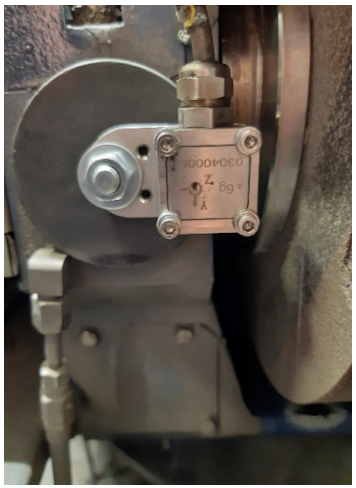


(b) Top view schematics

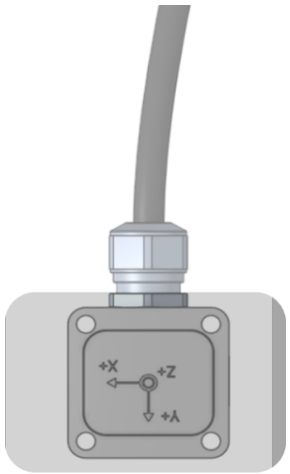
4 Phases – I

Hardware & Data sources

- 3-dimension accelerometer
- mobile cabinet
- log file (operational data)



(a) Installation photo



(b) CAD render

4 Phases – II

Installation

- red and blue sides
- local (x, y, z) for each sensor placement
- global (X, Y, Z) for the entire production line
- sensor orientation and installation angle

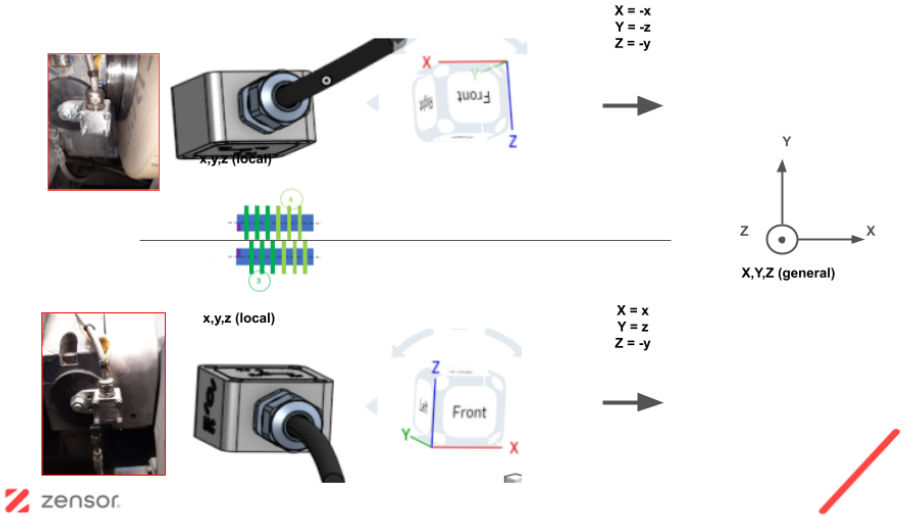
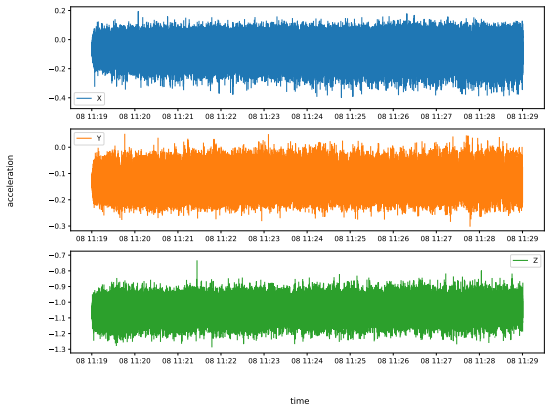


Figure 5: From local to general coordinate system

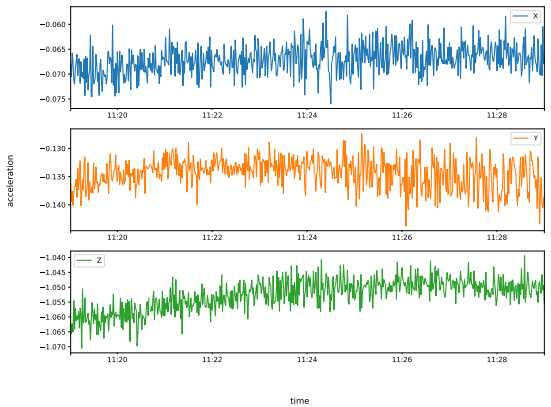
4 Phases – III

Data Management

- single data stream
- $ACC_{x,y,z} \longrightarrow DB$
- 60Hz to 1Hz /w Lambda



(a) 60Hz raw vibration



(b) 1Hz raw vibration

Conclusion

Grazie per l’attenzione