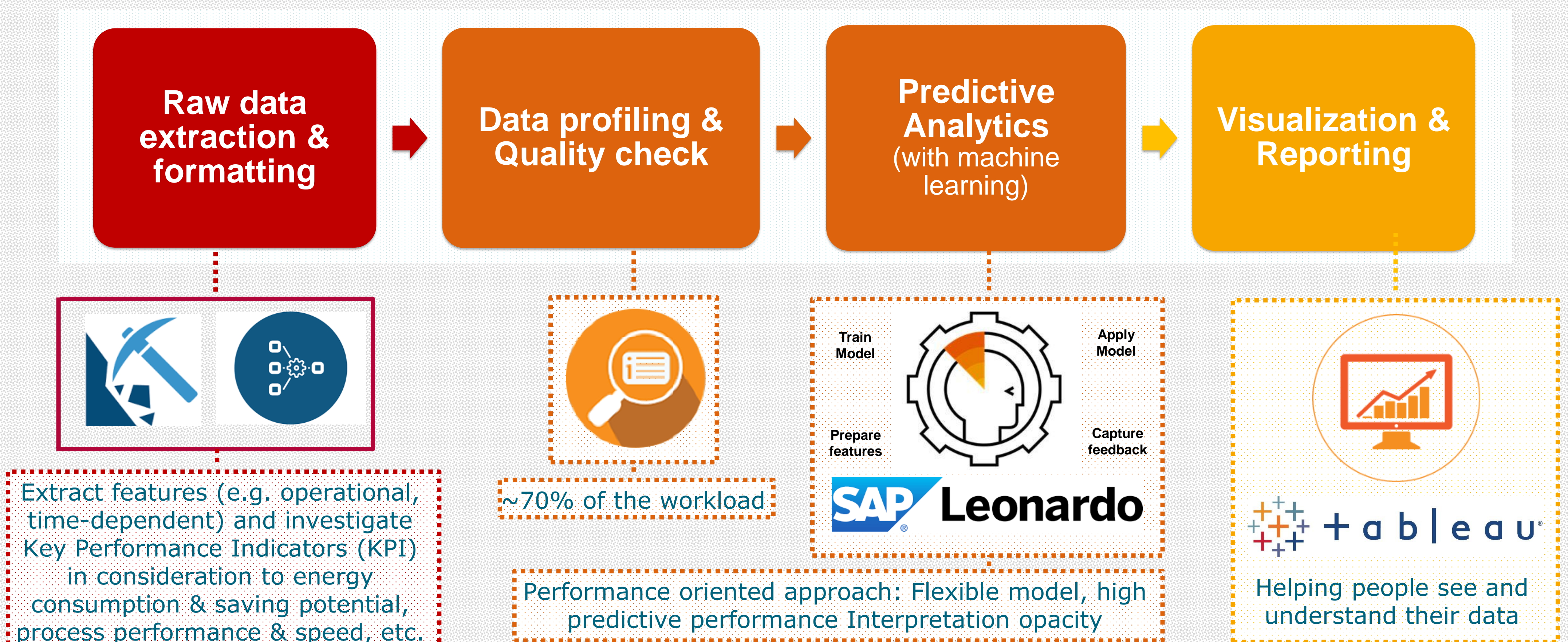


# Data Engineering: Moving Mining Industry into the future - by doing more with less

## Abstract

A vision of how to move the mining industry into the future, assisting mining companies to integrate operations and embrace new technologies to do more with less. The nature of mining has not changed or achieved any major breakthroughs for decades. Unleashing the potential of data engineering within the industry can bring new innovations such that a breakthrough can be achieved. The key is to build a comprehensive understanding of the available resources, optimizing material and equipment flow and laying a desirable roadmap to focus on energy efficiency. System and process performance can now be monitored in real time and improved by incorporating and combining state of the art data analysis techniques, operational statistics and machine learning. Resulting in a performance-oriented approach, utilizing the power of predictive analytics in full swing. Finally results and accurate reports can be synthesized with advanced data visualization tools such as tableau to help interdisciplinary teams understand the data and implement the optimized solutions efficiently. Together the real potential behind these tools will represent a fundamental shift in the mining sector moving the whole industry to the next level. In the use case below the methodologies and data engineering techniques are currently utilized. Providing an example how data mining & predictive maintenance can be deployed in energy efficient coal mining.

## Data Processing Strategy



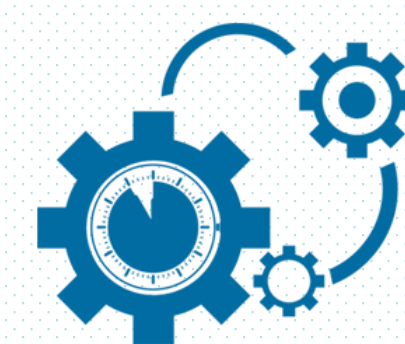
## Use Case: Improving process & energy efficiency of Open-pit mine conveyer belts

Process performance	• KPI: Load factor, time wise & quantity per time unit
Energy efficiency	• KPI: Energy intensity per ton of materials carried
Energy consumption	• Feature aggregation: Computing energy related features including weather & temperature related features
Energy dispersal	• Correlation matrix, residual analysis & identifying non-linear patterns in belt tension oscillations
Energy saving potential	• Combining best predictors • Model: Multiple linear regression
Speed optimisation	• KPI comparison over time periods
Event analysis	• Principal component analysis

**enersis**  
UNDERSTANDING DATA

## Next Generation of Mining

Decision-making and asset performance can be improved, by processing both financial and non-financial features that affect overall profitability



Prevent or reduce number and severity of serious safety incidents



Real-time analytical reports can be generated to improve asset utilization, minimize downtime and optimize fleet resources utilizing stream processing services. e.g. Apache Flink.



Improved energy performance in analyzing energy consumption, saving potential and possible process speed optimization.



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### More Information

- Avantis by Schneider Electric, <http://software.schneider-electric.com/pdf/industry-solution/predictive-asset-analytics-to-improve-mining-operations/>
- Bulletin by Colin Beaney, <https://www.ausimmbulletin.com/feature/predictive-analytics-future-asset-optimisation-mining/>
- McKinsey&Company, <https://www.mckinsey.com/industries/metals-and-mining/our-insights/how-digital-innovation-can-improve-mining-productivity>