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Apgar Consulting

**Advanced Analytics for
Operations**

September 2022

Apgar Consulting at a glance

Apgar Consulting is a leading data advisory company

It supports its customers in their journeys to:

- build the data management foundations for governed access, sharing and consumption of trusted data
- leverage the power of analytics, machine learning and big data to create business value at scale

Based on strong values, Apgar Consulting aims to provide sustainable advisory services. Innovation and pragmatism are the keys of our data-minded approach.



Commitment



Partnership



Innovation



Sustainability



Apsar Consulting at a glance

Presence



- +140 data consultants as of today
- + 30 data consultants in Iberia

Strong References in Several Industries

We have a strong data management know-how in various industrial sectors





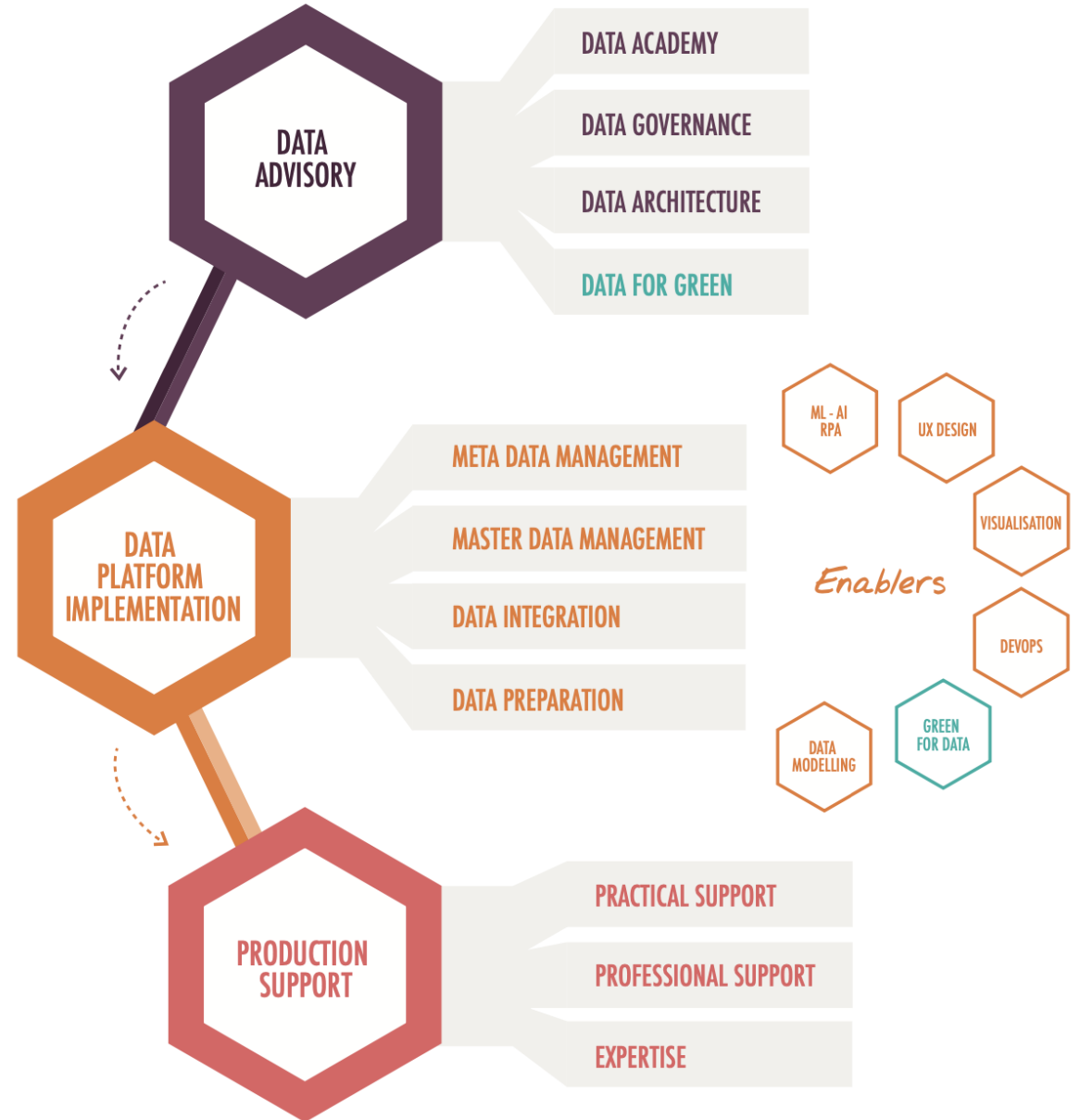
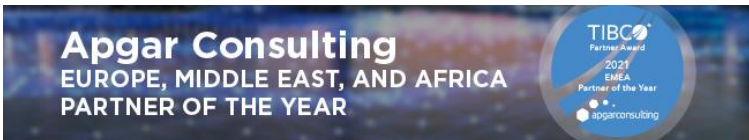
Apgar Consulting at a glance

Data Management Services and Solutions



Apgar Consulting is identified by Gartner in the 18 top MDM External Services Providers in the 2021 MDM Market Guide for the second year in a row.

Partners Recognition



Apgar Consulting at a glance



Advanced Analytics

Leverage the power of Artificial Intelligence (AI), Big Data and the Cloud to create business value at scale.



End-to-end ML Solutions

Our Data Engineers, Data Scientists, and Machine Learning Engineers deliver ML solutions following an agile and value-oriented methodology



Real Time AI Driven Insights

Implement integrated real time advanced analytics solutions to enable a 360° degree view of your operations.



RILP Solution for AI Driven Operations Optimization

RILP is an integrated AI platform that trains ML models used to optimize resource allocation and operational control systems in complex and uncertain contexts. Examples: dynamic allocation of machines in manufacturing to optimize yield, control of wind turbines parameters to optimize energy production.



AI Driven Operations Optimization

“Companies that fully absorb AI over the next 5-7 years may double their cash flow; those who don’t could see cash flow decline by about 20%”*

*according to McKinsey Global Institute



Challenges in Manufacturing and Supply Chain Operations.

■ Complexity

- Geographical fragmentation & complexity of manufacturing operations.
- Traditional quality control & inspection methodologies are resource intensive and still may not capture all the defects

■ Profitability

- Optimize supply chain and factory processes by using existing data.
- Early detect product quality deviations and anticipate equipment failures in real time.

■ Supply Chain Volatility

- Early detect supply chain volatility and respond in real-time to changing market and supply chain conditions

Challenges in Manufacturing and Supply Chain Operations.

■ Demand volatility

- Products and services demand have high volatility, requiring frequent rescheduling.
- Digital channels increase the pressure for near real time production planning and control.

■ Profitability and sustainability

- Energy and raw materials costs are sky rocking.
- Good human resources are in short supply and costly.
- Pressure to reduce greenhouse gas emissions.

■ Limitation of classic optimization approaches and tools

- Classic optimization models struggle to model all the complexity of the real world (large number of variables and stochasticity).

Imperatives in Manufacturing and Supply Chain Operations.

- **360° View of your factory operations**

Provide a situational awareness of your factories to make it easy to monitor relevant operational KPIs and to explore the causes behind unexpected performance.

Leverage the large amount of data generated in real time to proactively identify and alert for abnormal operational patterns, anticipate failures and suggest preventive maintenance interventions.

- **Real Time Supply Chain Analytics**

Integrate and analyze data across the entire value chain to optimize processes, evaluate suppliers' operational performance, and to promptly identify and react to supply chain disruptions and unexpected fluctuations in customer demand.

Imperatives in Manufacturing and Supply Chain Operations.

- **Factory Processes Optimization**

Improve yield and reduce energy and raw materials consumption by optimizing job scheduling and other shop floor resource allocation operational processes.

- **Supply Chain Processes Optimization**

React in real time to changing supply chain conditions to optimize customer service levels, optimize warehouse operations and inventory management



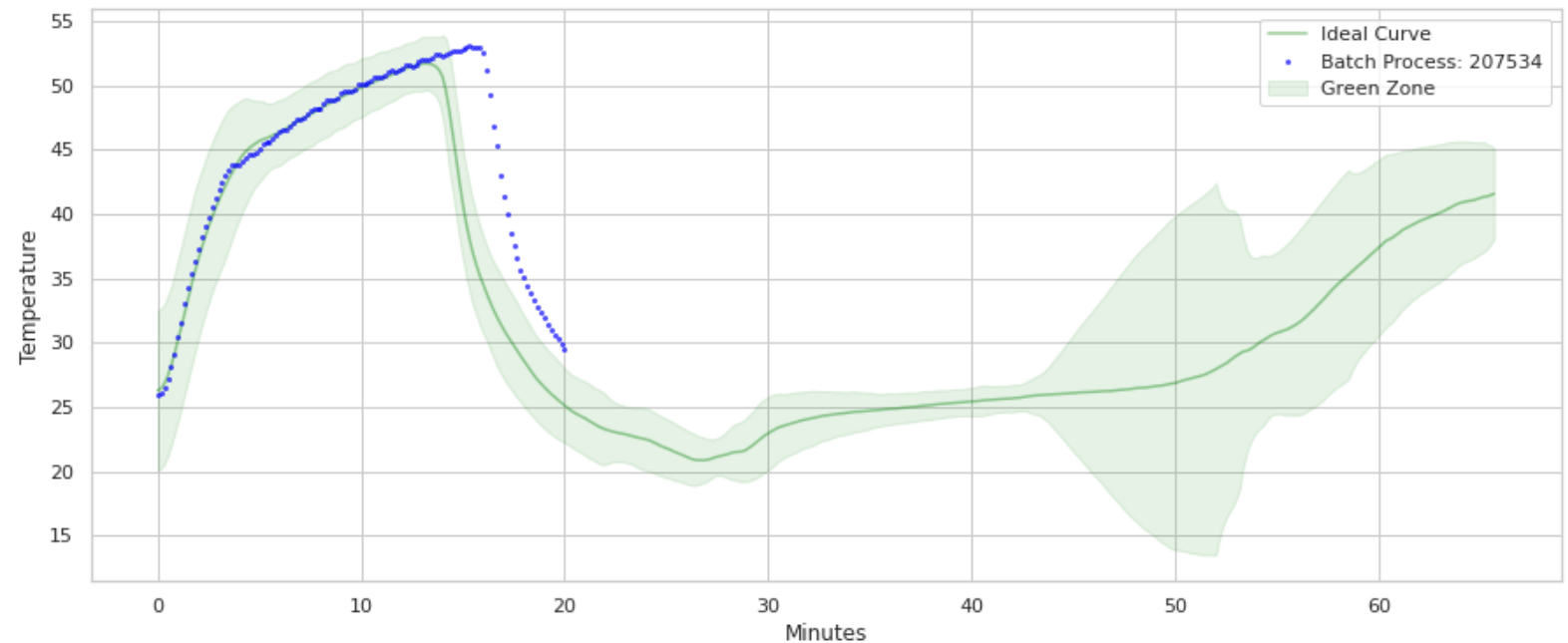
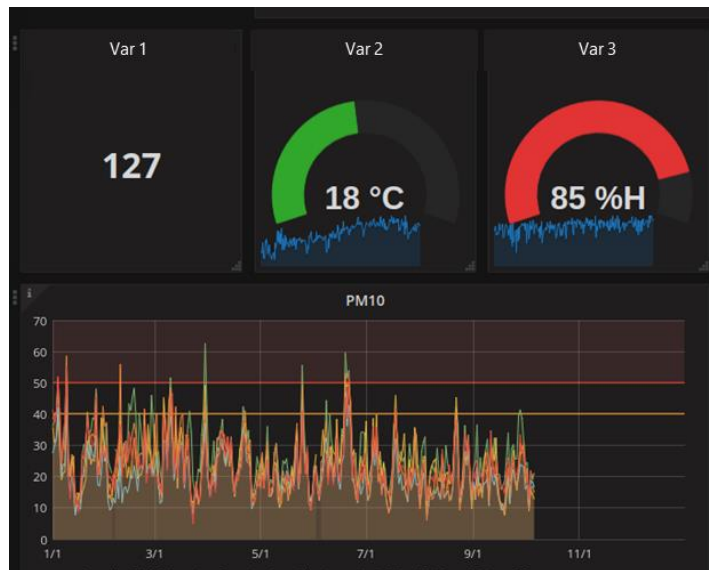
Real Time Advanced Analytics



Real Time Advanced Analytics solutions

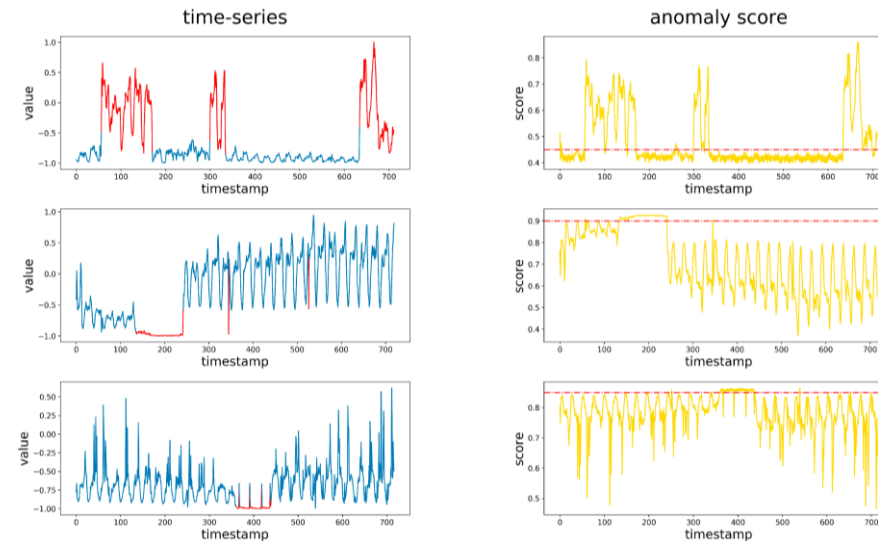
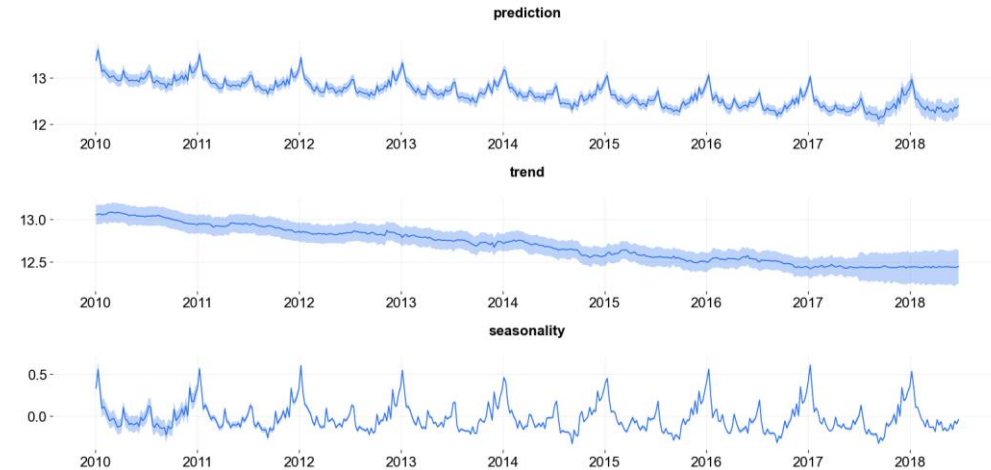
We provide real time advanced analytics solutions:

- a) Event data streams ingestion and other back-office data integration capabilities.
- b) Time series optimized storage to be easily processed and queried.
- c) Real time dashboards to easily visualize and explore time series data for root cause analyses.



Machine Learning Time Series solutions

- We create ML Time Series solutions for forecasting, abnormal patterns recognition, and slow changing trends identification.
- We leverage an easy-to-use cloud agnostic platform to train, evaluate and serve those machine learning models



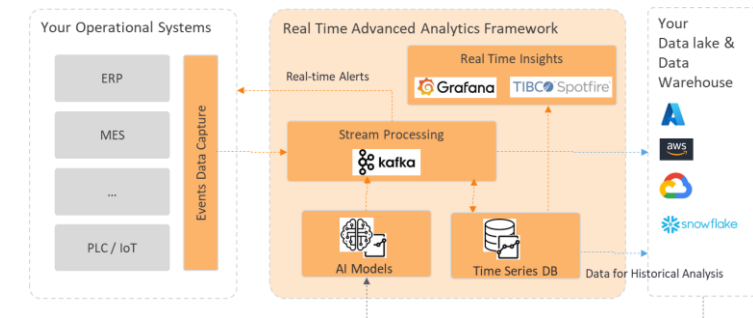
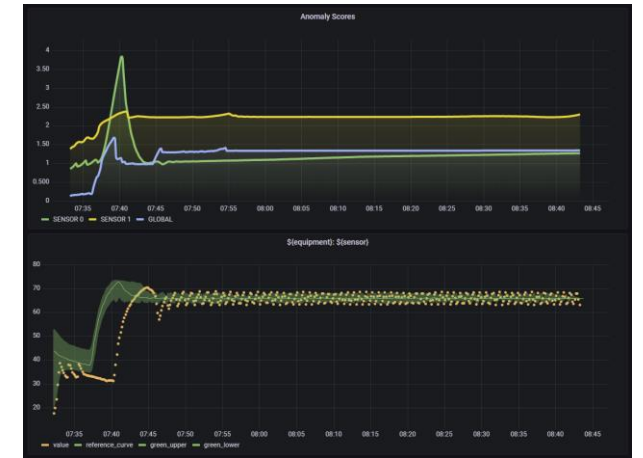
AI Driven Real Time Insights: Pharma Use Case

1. Business Challenge:

- a) Closely monitor the critical variables of drug manufacturing processes and automate the detection of abnormal patterns to improve yield and reduce waste.

2. Work done and benefits:

- a) Specialized Time Series Machine Learn algorithms were used to create Anomaly Scoring models and define “green zones” (acceptable values) and outlier thresholds for alert.
- b) A scalable event processing pipeline was implemented to generate in real time Anomaly Scores for each sensor and for an equipment as whole.
- c) The data pipeline includes a specialized time series database and a specialized time series visualization tool.
- d) Now issues in drug manufacturing operation can now be detected much earlier in the process and with close to none human supervision effort.



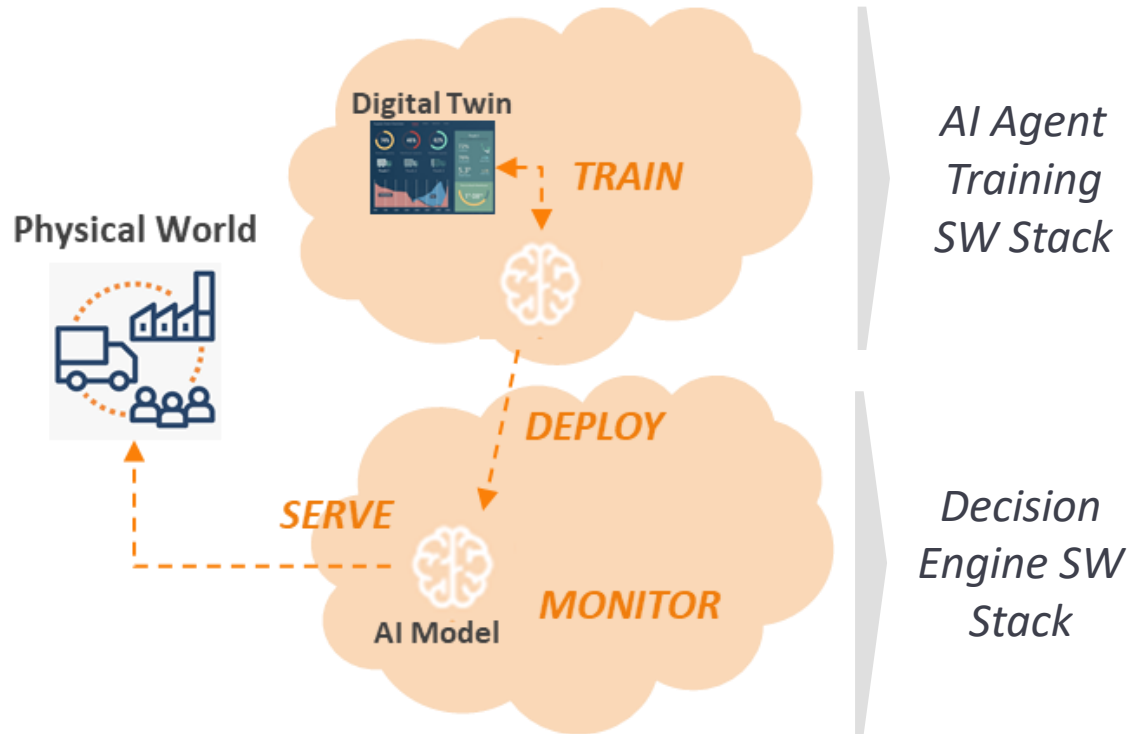


AI Driven Operations Optimization



RiLP AI Platform for Operations Optimization.

How does it work.



Main Strengths.



Simple to Use

Train, deploy, serve and monitor ML models with minimal coding experience and no data science skills



Simulation based training

ML models are trained using a simulation (digital twin) of your real system instead of historical data



Scalable and low cost

Use your private cloud or low-cost public cloud computing services for virtual infinite scalability



Powerful AI behind the scenes

A wide range of DRL algorithms and hyperparameter tuning capabilities are included for advanced use cases

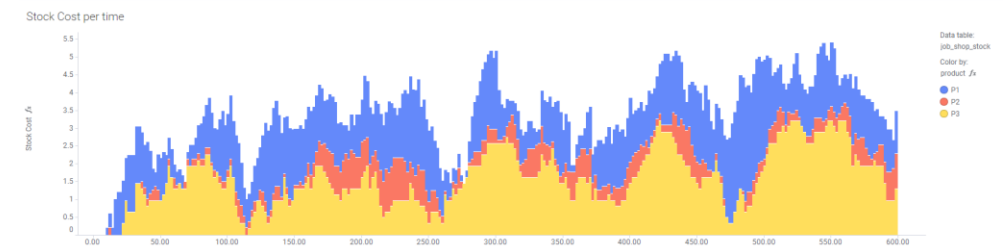
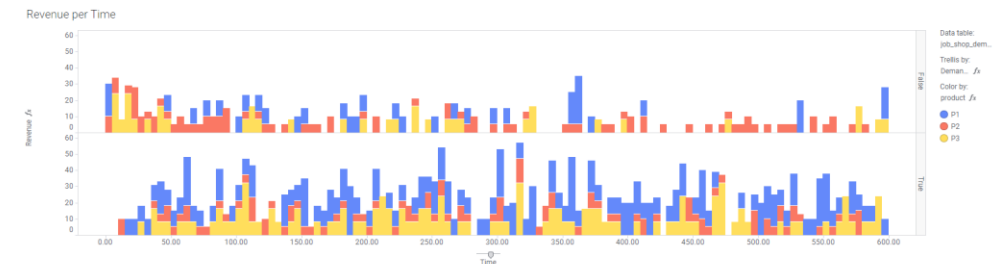
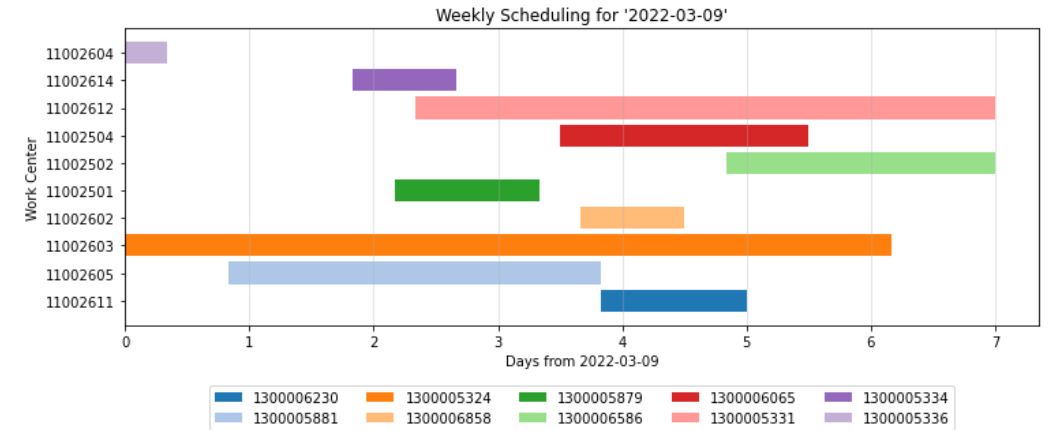
AI driven Job Scheduling: Plastic Bottle Manufacturer Use Case

1. Challenges:

- a) Minimize job scheduling transition costs (labor and raw materials) in a large plastic bottle plant (60 machines and 250 SKUs) while ensuring customer demand SLAs are met.

2. Work done and results:

- a) APGAR RiLP used to train an ML Model that was able to generate at any moment an optimized scheduling plan, considering the current machine status, product stock, and forecasted demand.
- b) The solution was complemented with a Constraint Programming algorithm to create medium term job scheduling plans.
- c) The preliminary results show a potential 30% cost reduction and more consistent decisions than the baseline heuristic used by human schedulers.





AI Driven Operations Optimization

Approach and Differentiators

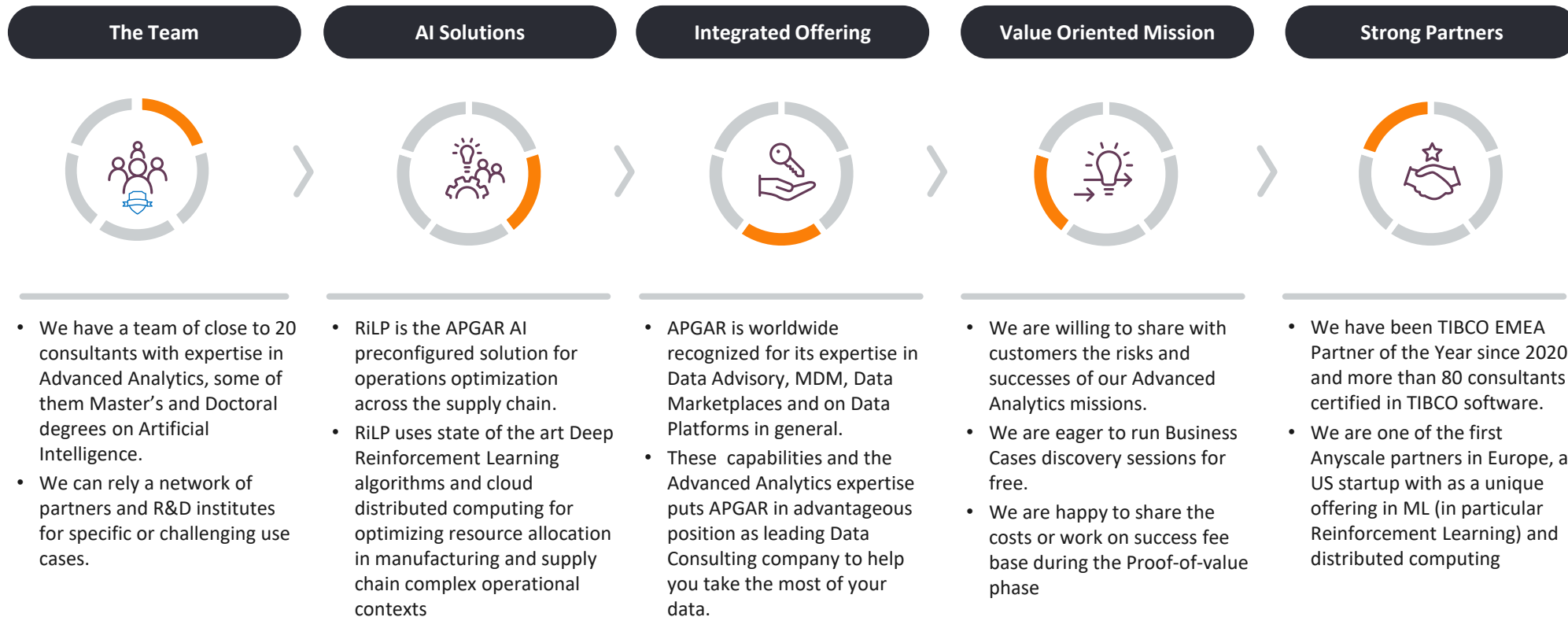


Customer Engagement Approach



AI Driven Operational Excellence.

APGAR Consulting main differentiators.





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