Decision Making in Winery and Packaging Operations

Improving Production Performance using IIoT, Automation and AI

James Balzary

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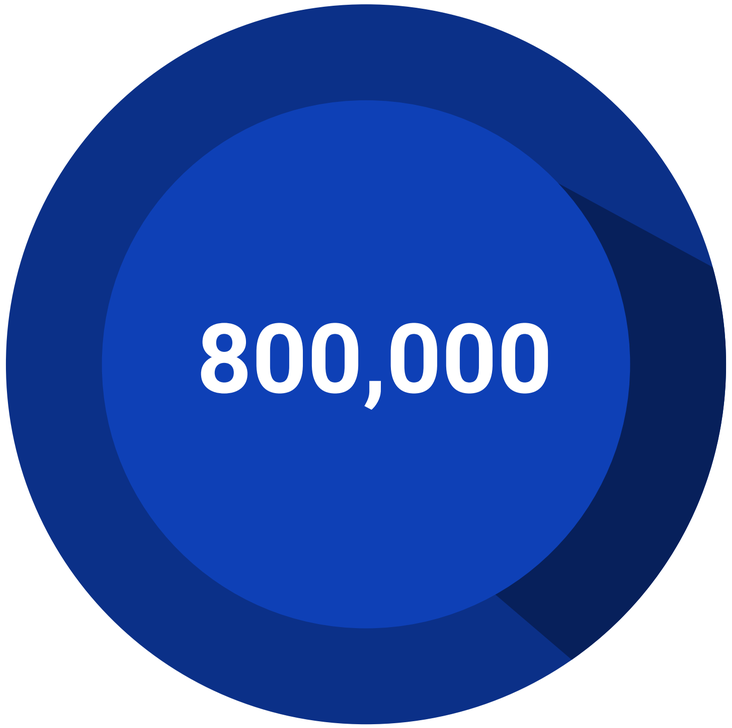
We manufacture wine in a world that is rapidly automating and optimising…..

Why is it important?

For Large and Small businesses

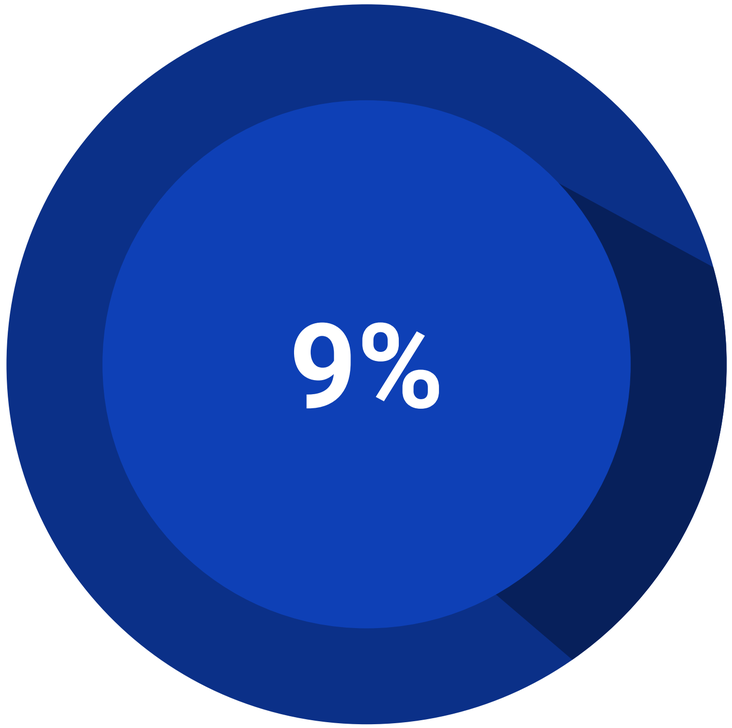
Automated Technologies

IDC FutureScope: Worldwide Digital Transformation 2018. IDC



Automatable Tasks

PwC The Future of Work: 2017



Investing in Automation and AI

Alpha Beta Strategy and Economics Report: The Age of Automation 2017

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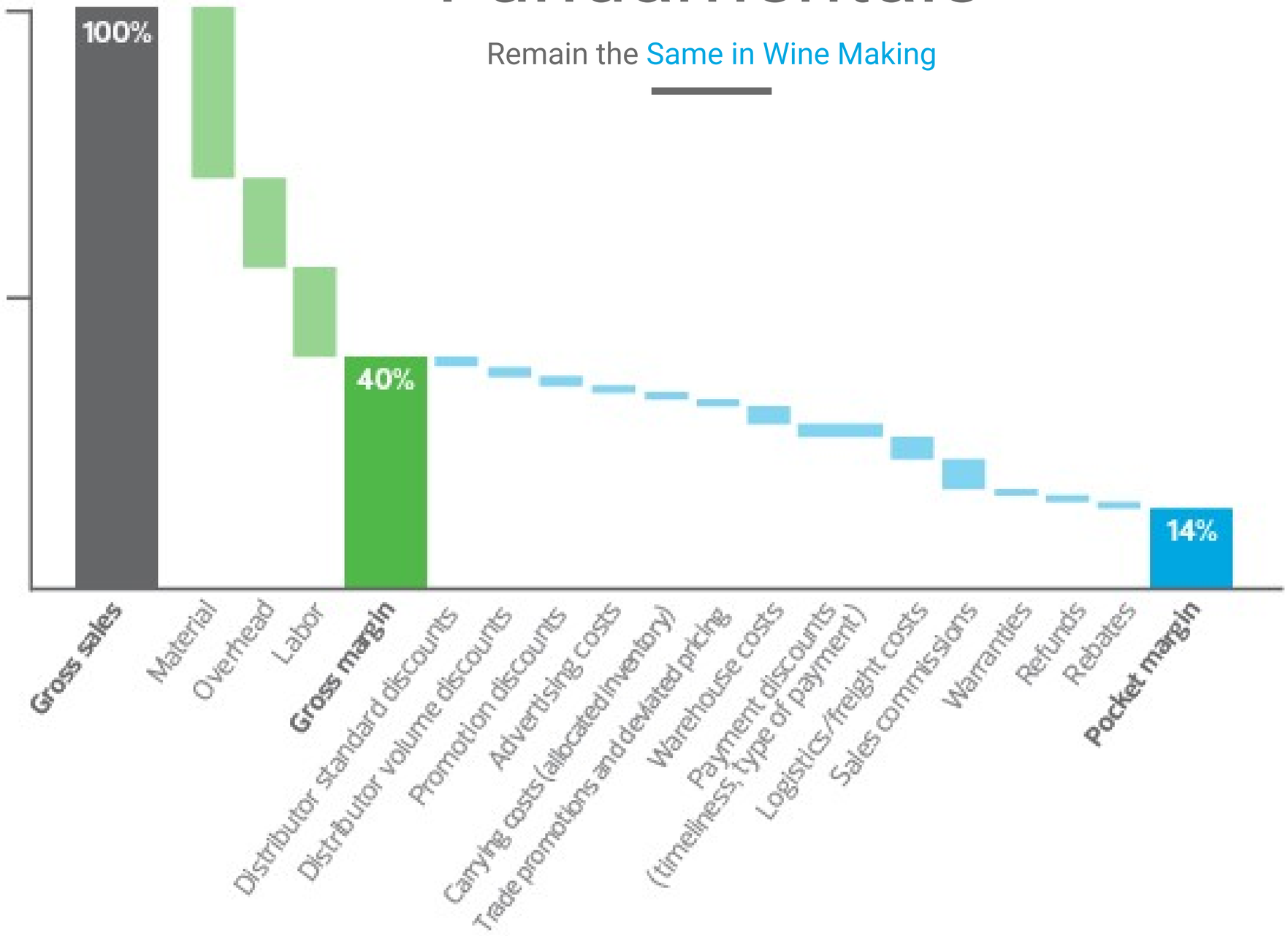
Fundamentals

Remain the Same in Wine Making



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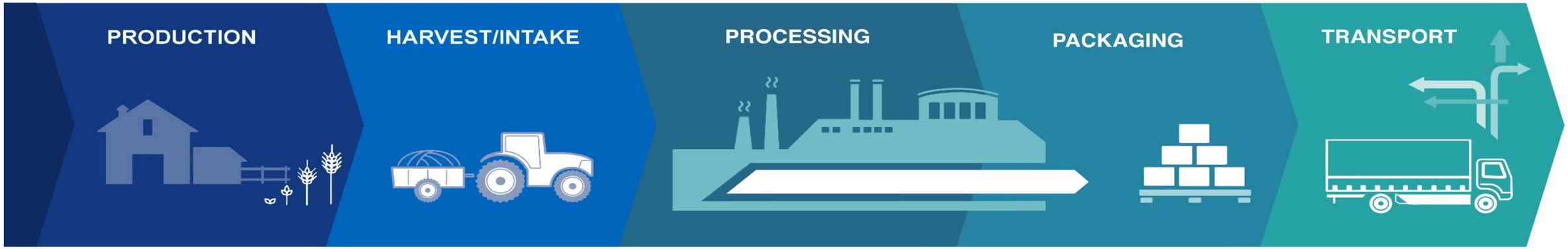
Value Leaks

Typical Supply Chain and Production Environments



Viticulture → Intake → Crushing → Wine Making → Bottling & Packaging → Distribution and Sales

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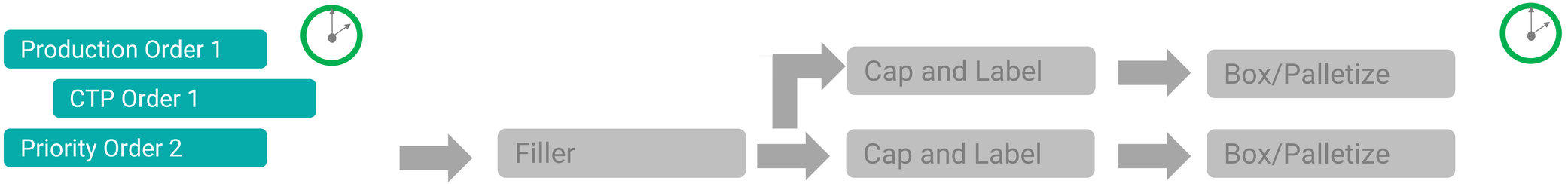
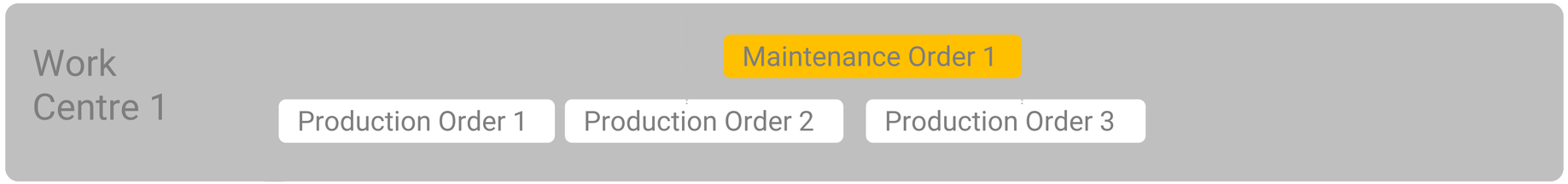
Value Leaks

Operational and Organisational





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Value Leaks

Resource Management

Strategic:

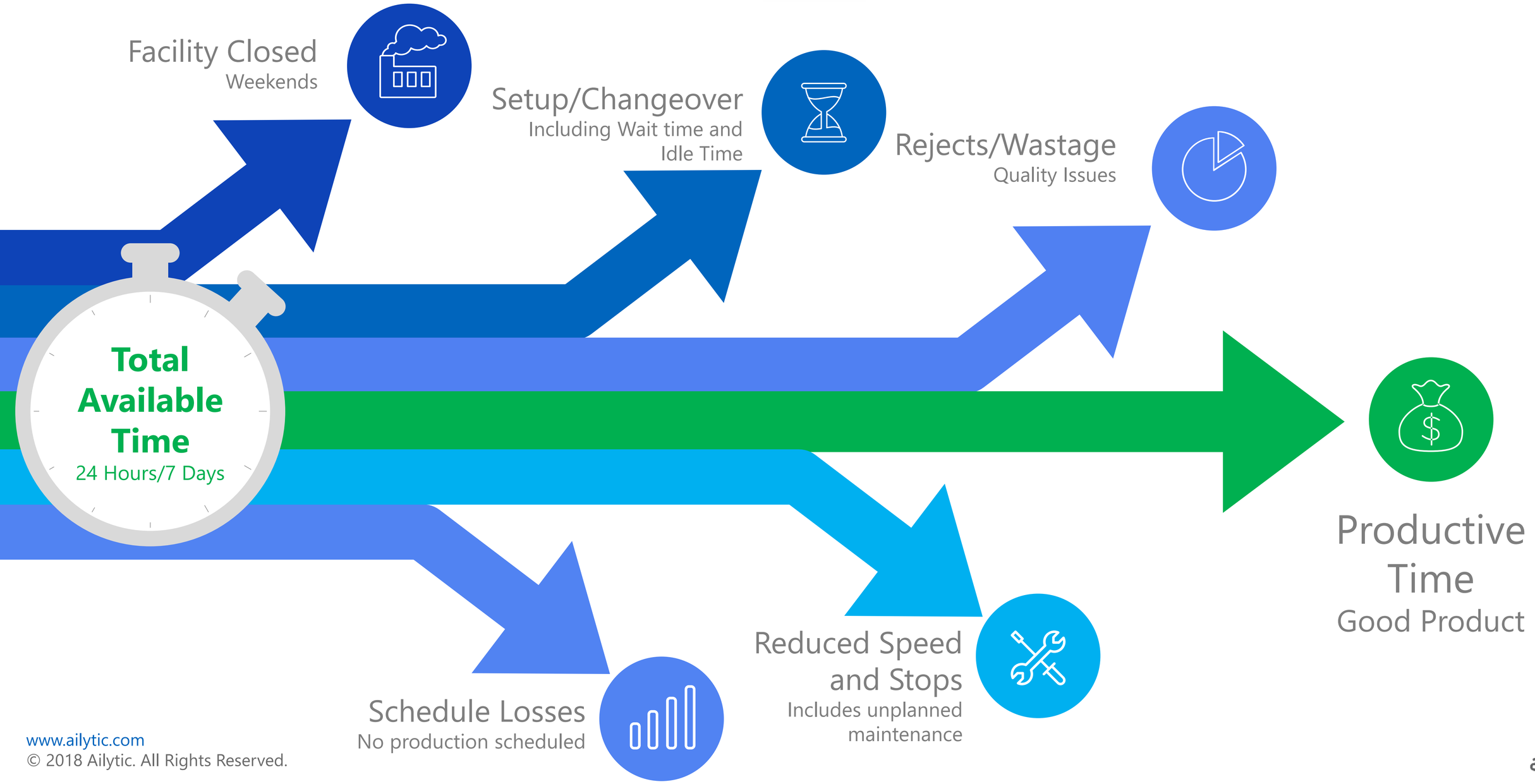
- Network Capacity
- Capital works
- Intake Optionality

Tactical:

- Winery Workload
- Labour
- Equipment

TEEP/OEE Drivers

Increasing Productive Time



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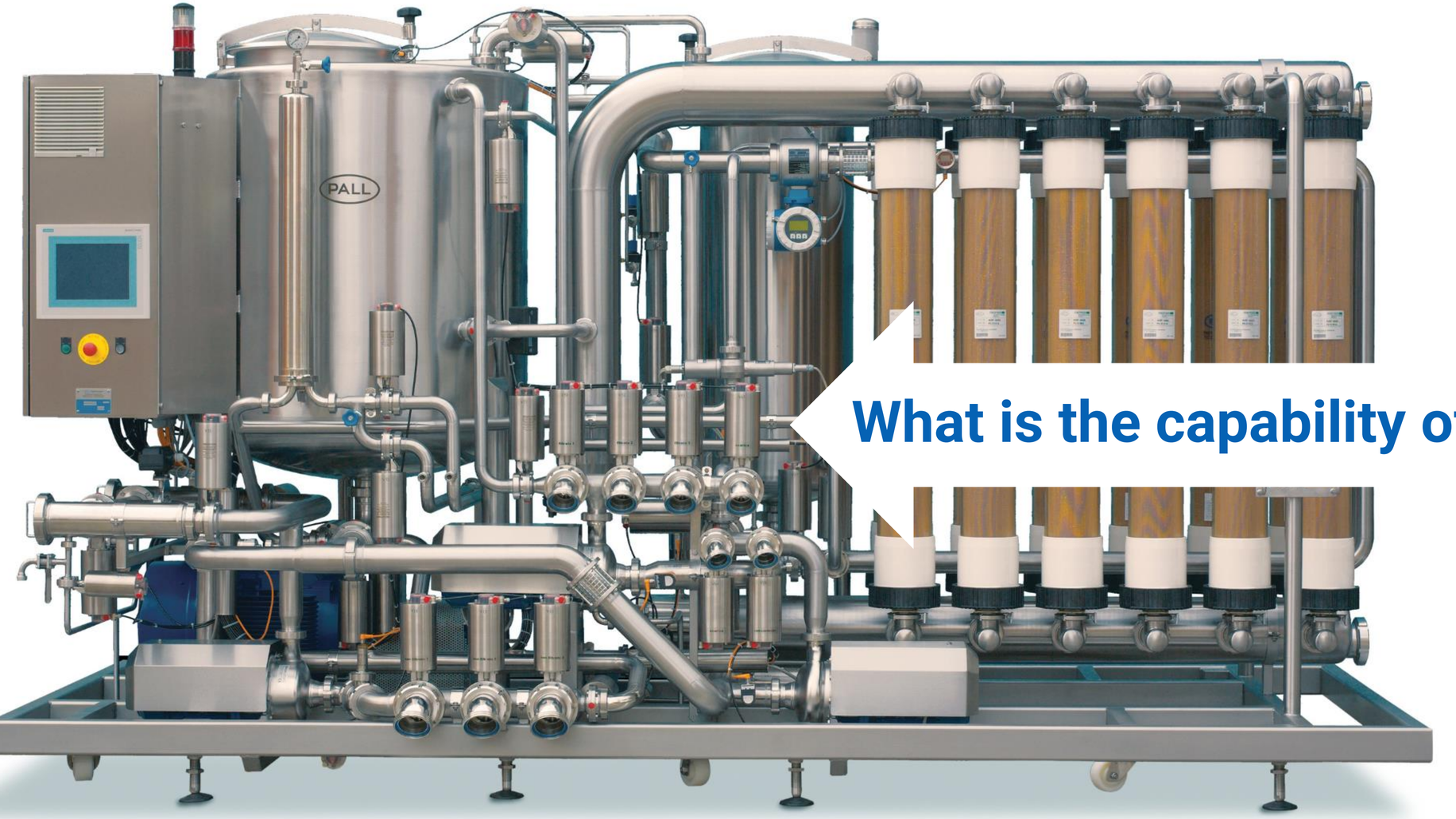
Common Knowledge Gaps



What is the capability of this machine???

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Decision Making Puzzle

Can Intuition destroy value??

Four travellers approach a bridge…

Each travels at a different speed:

A – 1 minute
B – 2 minutes
C – 5 minutes
D – 10 minutes

Challenge: schedule the travellers to minimise the total time to cross the bridge

Notes:

- Travel at night
- Only one torch
- Maximum 2 travellers on the bridge at a time and they have to walk together with the torch
- Can only cross at the speed of the slowest person in a pair
- No tricks

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Decision Making

Intuition

A possible solution:

A & B	↑	2
A	↓	1
A & C	↑	5
A	↓	1
A & D	↑	10

19

where: A =1, B = 2, C = 5, D = 10

Heuristic: use the fastest traveller as much as possible

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Decision Making

Intuition often destroys value

An optimal solution:

A & B	↑	2
A	↓	1
C & D	↑	10
B	↓	2
A & B	↑	2

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where: A =1, B = 2, C = 5, D = 10

Heuristic: match the speed of the travellers as much as possible

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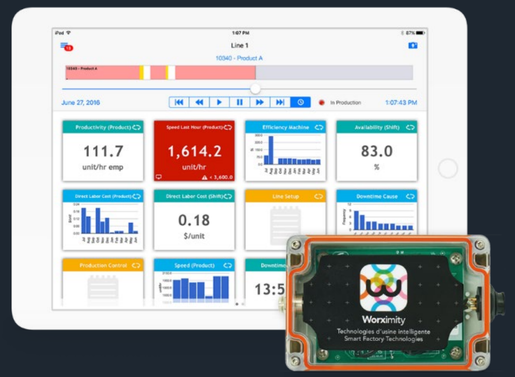
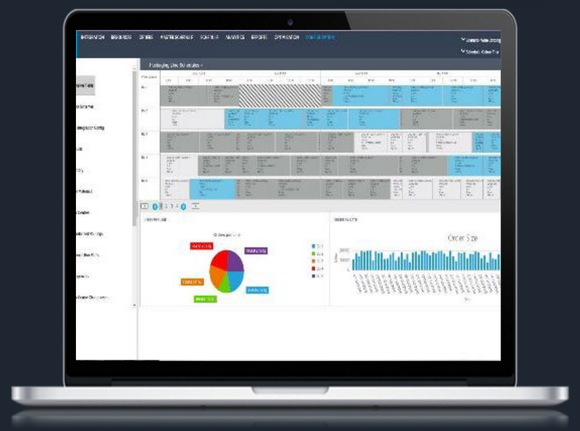
Approach

Stages to Optimal Decision Making





SENSE

Real Time Data Capture

ANALYSE

Data Analytics with Prediction

OPTIMISE

Intelligent Optimisation

DECIDE

Flexible and Dynamic **scheduling**

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IIoT

Smart Sensors

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Accurate Performance Data

Continuous Improvement

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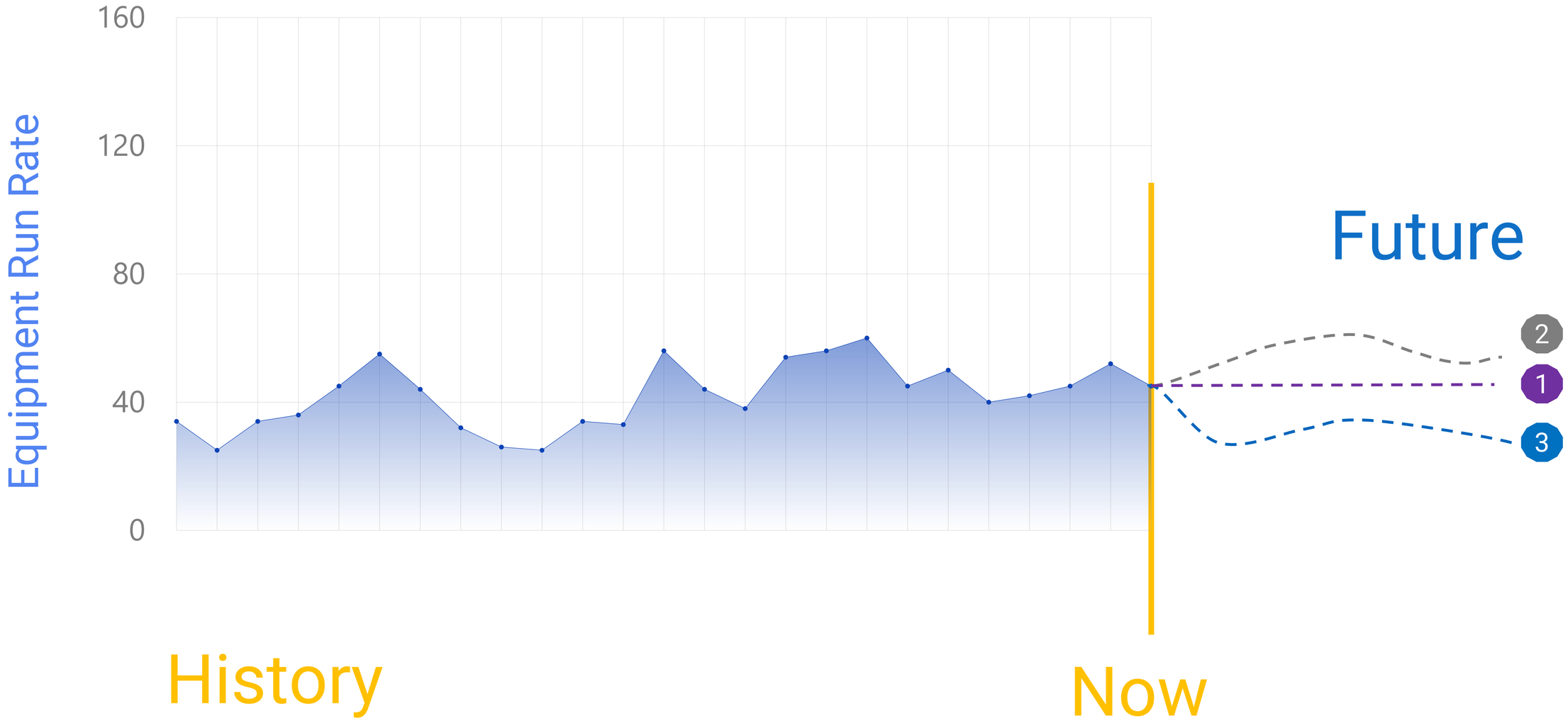
Predictive Capabilities

For more accurate decision models



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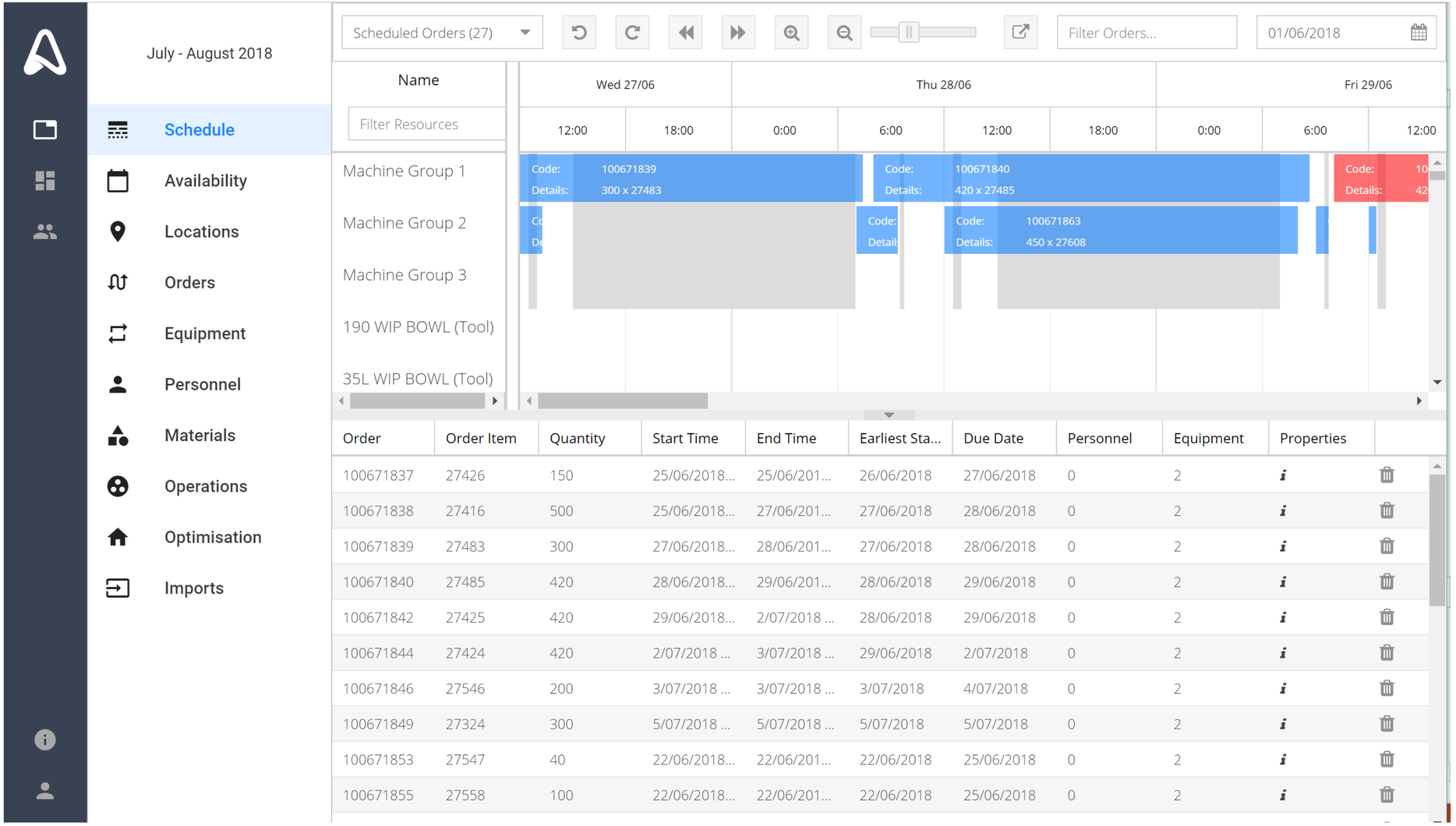
Optimised Schedules

Accurate Modelling of all Resources



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Levels of Maturity

Planning

(Automatic) Optimised Planning & Scheduling

Automatic generation of optimized plans based upon constraints

(Automatic) Rule Driven Planning & Scheduling

Automatic generation of feasible plans based upon rules

(Manual) Constrained Planning & Scheduling

No constraint violations allowed while manually planning & scheduling

(Manual) Unconstrained Planning & Scheduling

Manual process, provides better visibility, but requires constraint checking

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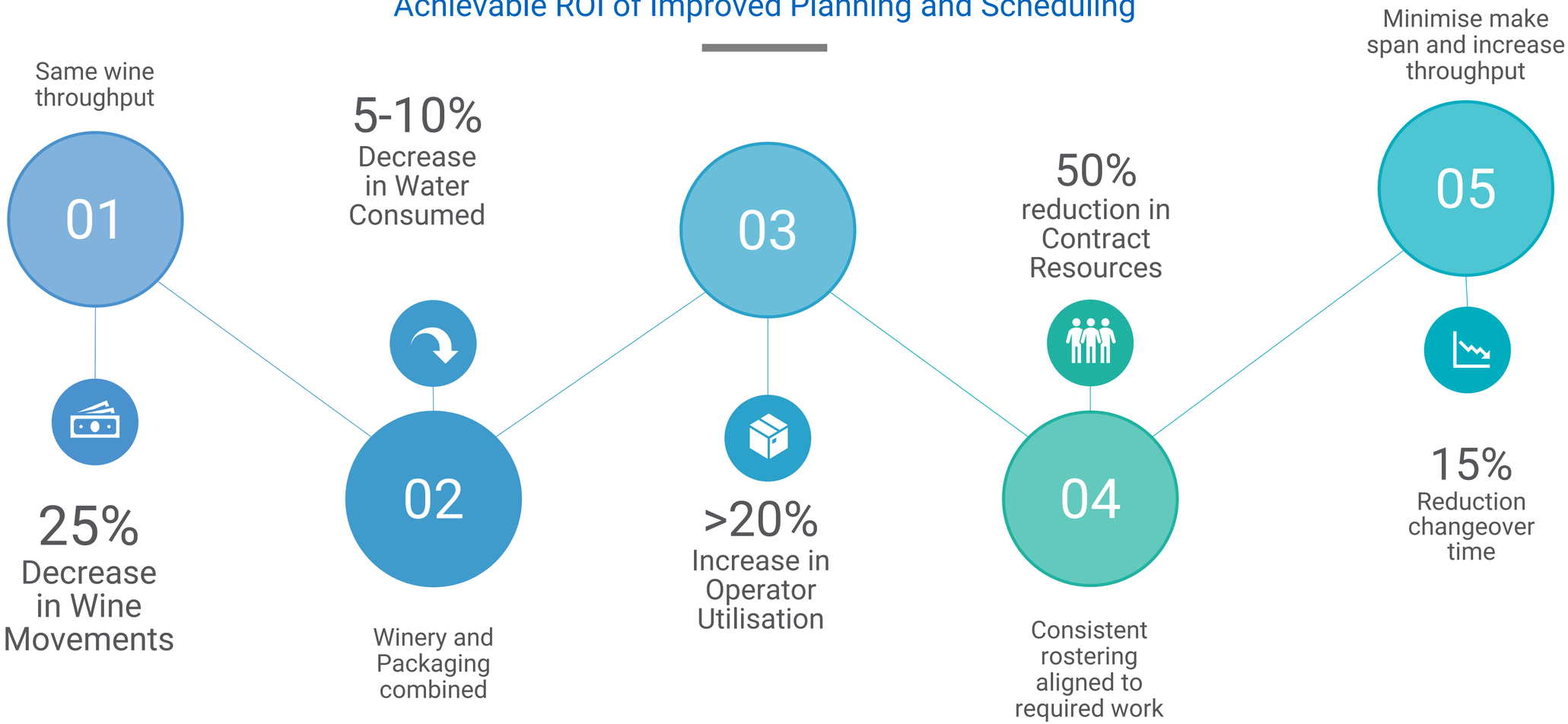
Benefits

Achievable ROI of Improved Planning and Scheduling



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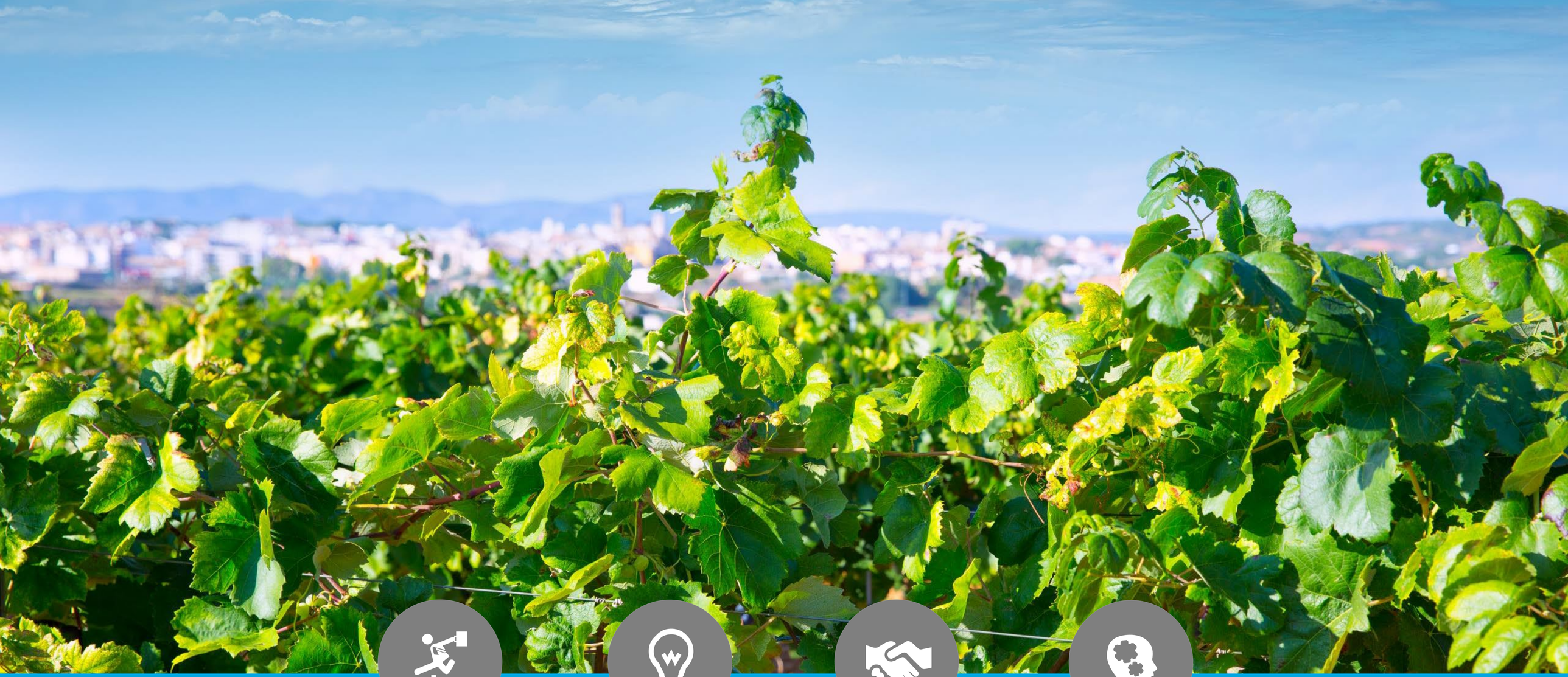

Model Accuracy

Integrate and Optimise

Consensus Visibility

Execution Analysis

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