

Demand forecasting

Back to college



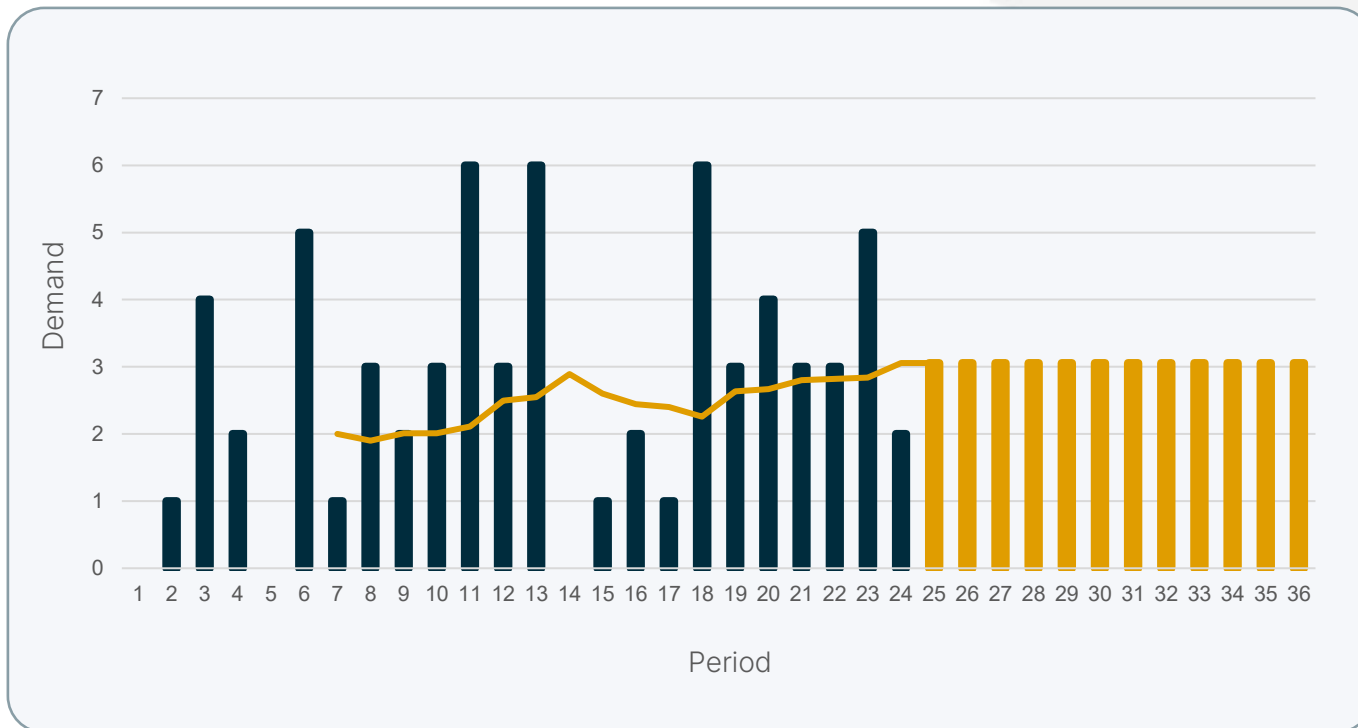
3-9-2026



GORDIAN 
SPARE PARTS MATTER

1. Why do we forecast?

We forecast for one reason: to decide when we need the next order.



What makes a good forecast?

1

Stable

Small data changes should not flip your order decision.

2

Understandable

You can explain why the number is what it is.

3

Actionable

0.2 or 0.4 per month: does it change when you order?



1.1 What makes forecasting difficult?

Recurring challenges in spare parts demand forecasting

01

Unexpected peak demand

Sudden spikes break historical patterns: a stable model reacts too slowly; a fast one overreacts.

02

Phase-in & phase-out

New and end-of-life parts have little or no history, exactly when the forecast matters most.

03

Business knows best (?)

Campaigns, overhauls and fleet changes are known events that history alone can never predict.

04

Typical size demand usage

When demand occurs per 40 or 80 units, a forecast of 60 feels strange.

05

Very slow-moving parts

How can we forecast based on only one or two historical demand lines?

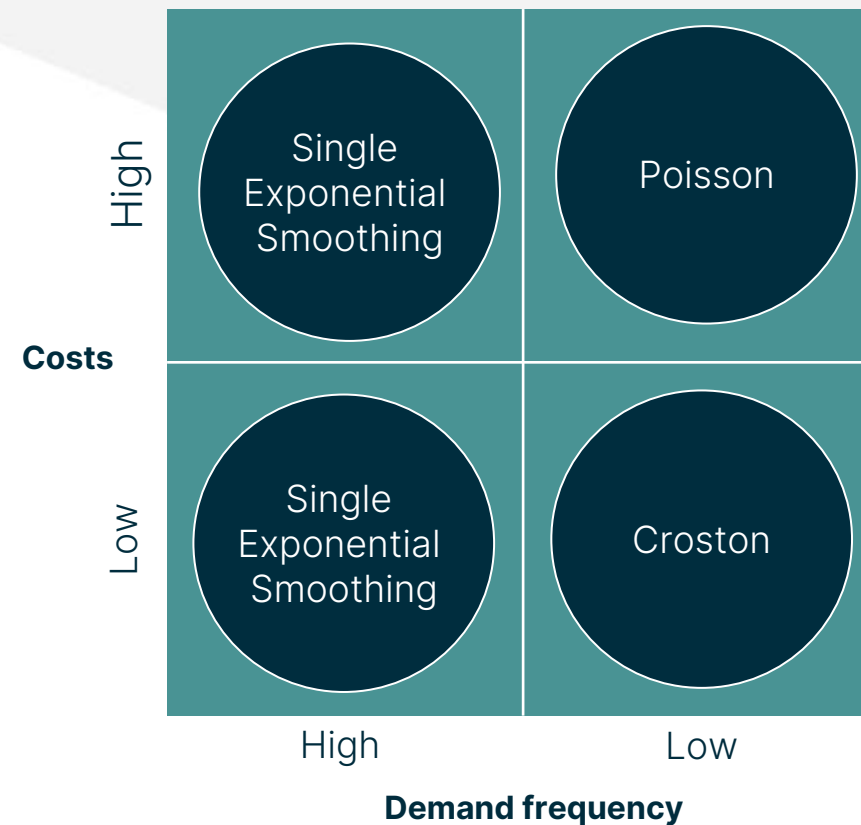
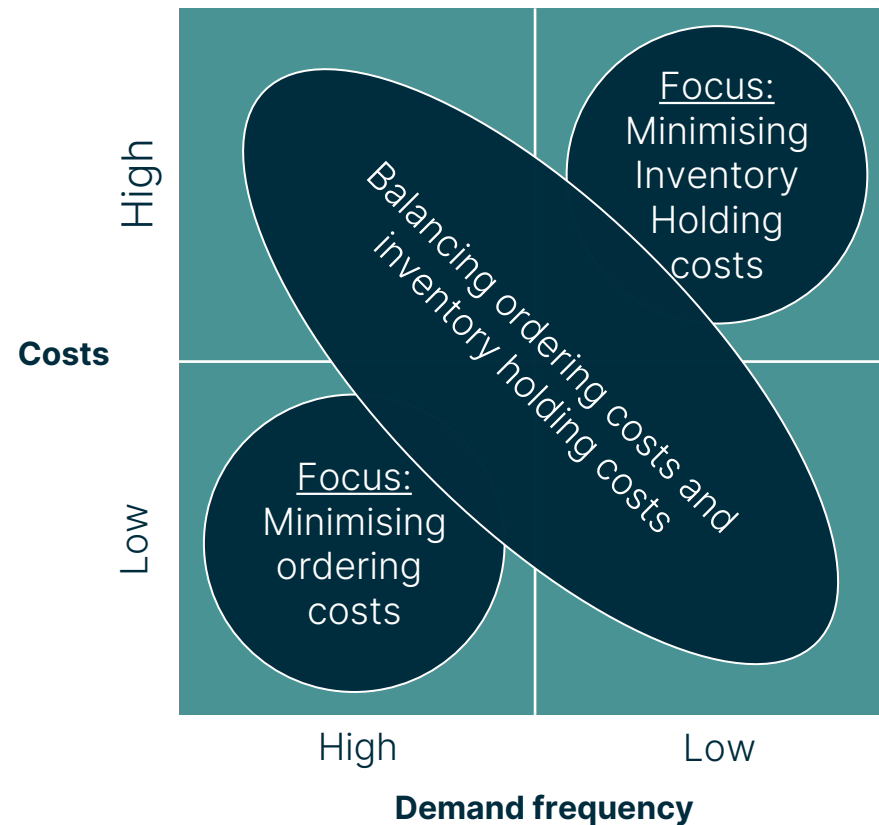


1.2 Spare parts management strategies

DIFFERENTIATED STRATEGIES TO FIND OPTIMAL BALANCE

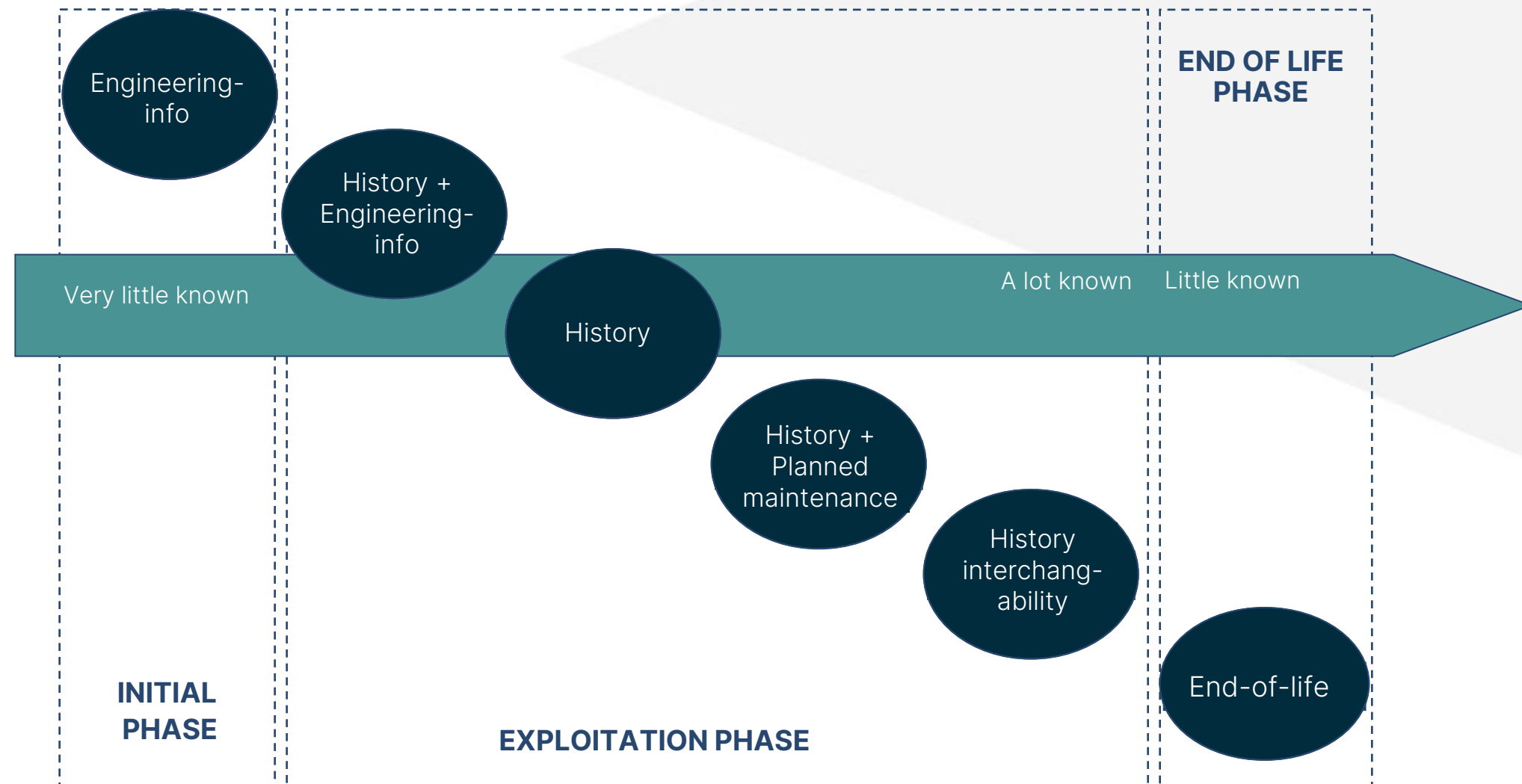


1.3 Inventory control and forecasting methods



1.4 Lifecycle management

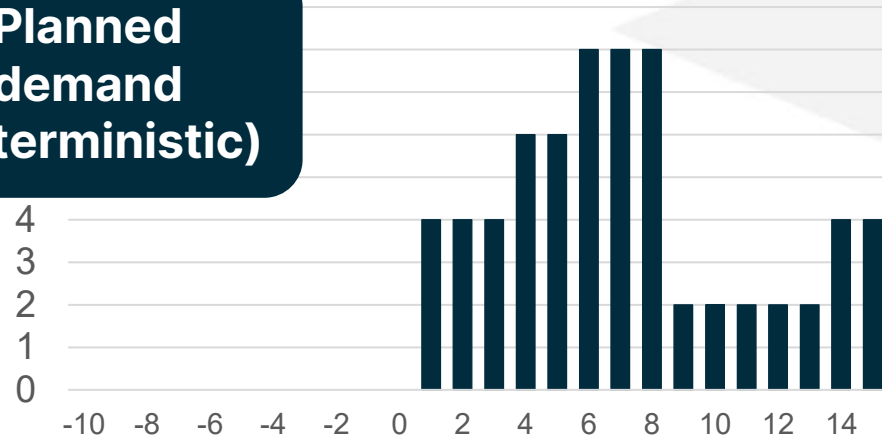
WHEN TO FORECAST PROACTIVE OR REACTIVE?



Different types of using the forecast

PLANNED VERSUS UNPLANNED

Planned demand (deterministic)



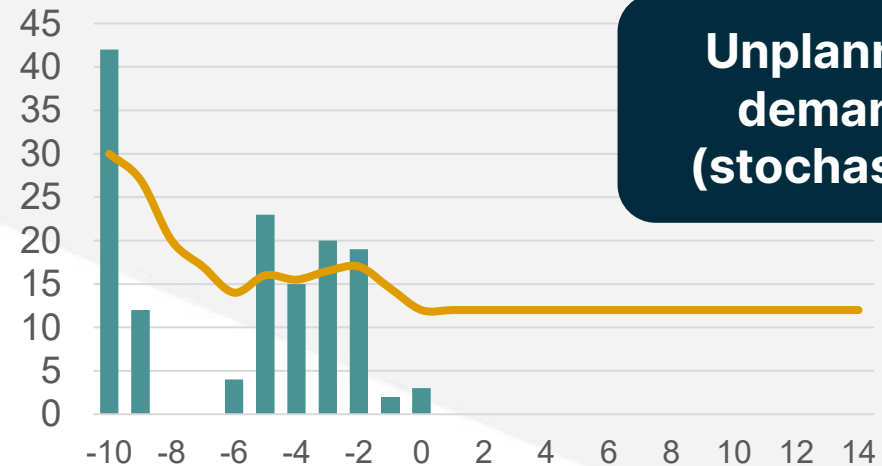
Planned demand:

- Demand is known
- Assumption: no/very small deviation in demand
- Mainly planned maintenance (or production demand)

Inventory
control model:

Demand driven
planning

Unplanned demand (stochastic)



Unplanned demand:

- Uncertainty in demand is expressed in a mean and standard deviation
- Mainly corrective demand, failure rate is difficult to predict

Inventory
control model:

Reorder point
planning



2. Overview demand forecasting

FORECAST BASED ON DEMAND HISTORY

Based on demand history

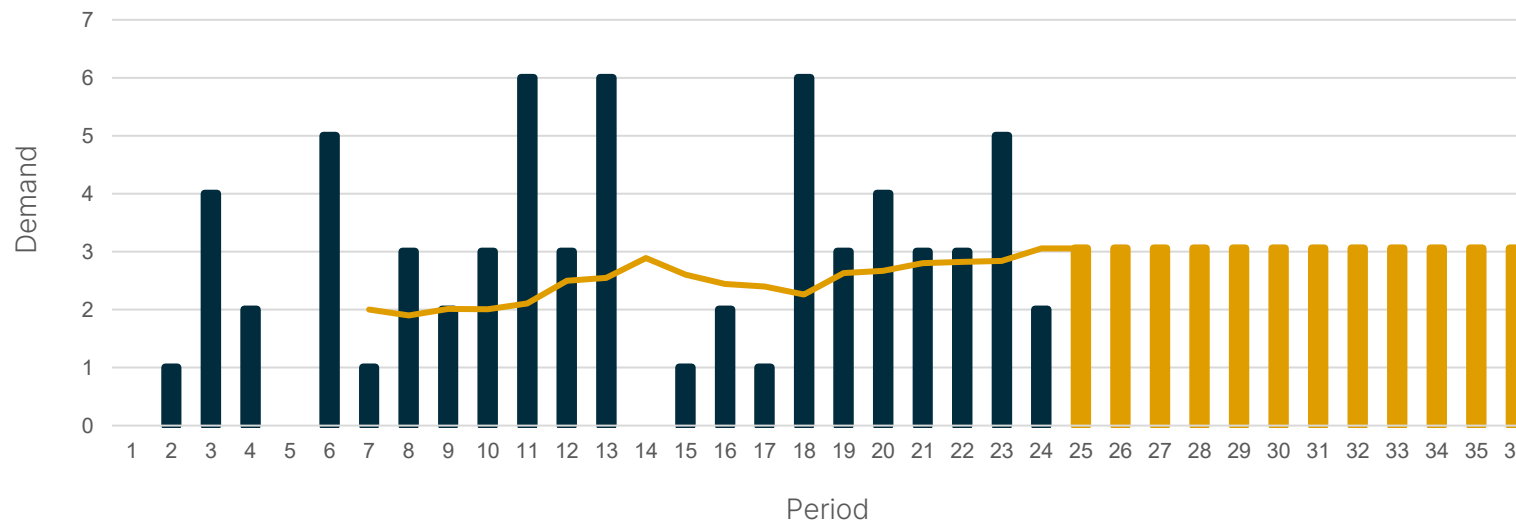
Based on engineering information

Based on maintenance planning

Combined forecasting

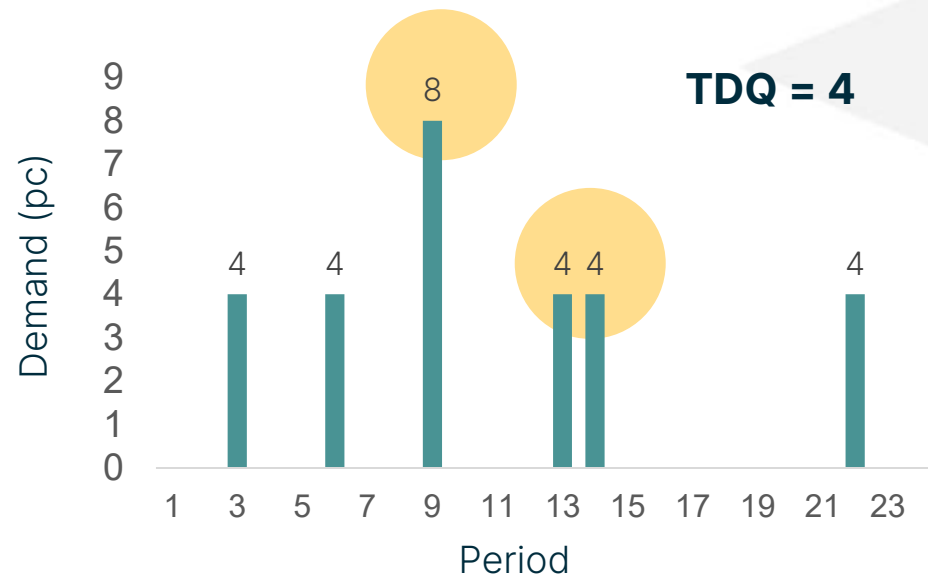
✓ Historical demand

History repeats itself - statistically



2.1 Slow moving forecast

POISON WITH A TYPICAL DEMAND SIZE



Example:

- The TDQ of this part is 4
- Lead time is 3 months
- It also appears that sometimes requests come in “groups”

- It seems sensible to at least stock 2x the TDQ. With a lead time of 3 months, this is sufficient
- **Result:** order up to level of **8 items**
- If the lead time is 6 months or more, 3x or 4x the TDQ is required



3. Overview demand forecasting

FORECAST BASED ON BUSINESS INFORMATION

Based on demand history

Based on engineering information

Based on maintenance planning

Combined forecasting

- ✓ Installed base
- ✓ Bill Of Material (BOM)
- ✓ Failure behaviour

When we know the future will be different

Installed base

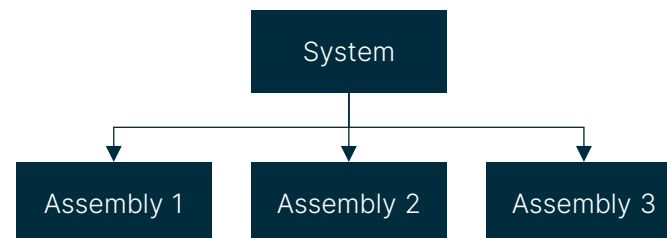


+

Configuration

+

Failure behaviour



MTBF



3. Overview demand forecasting

FORECAST BASED ON PLANNING

Based on demand history

Based on engineering information

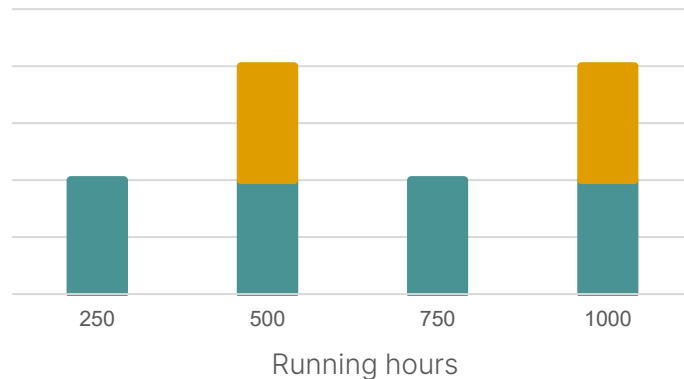
Based on maintenance planning

Combined forecasting

- ✓ Maintenance concept
- ✓ Utilization
- ✓ Need for material

When you know exactly when it will happen

Maintenance concept



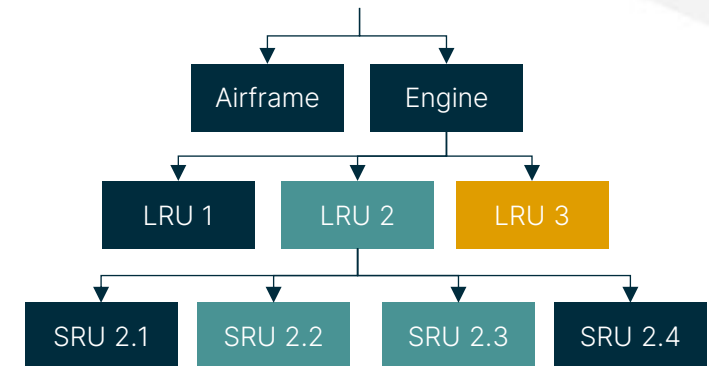
+

Utilization



+

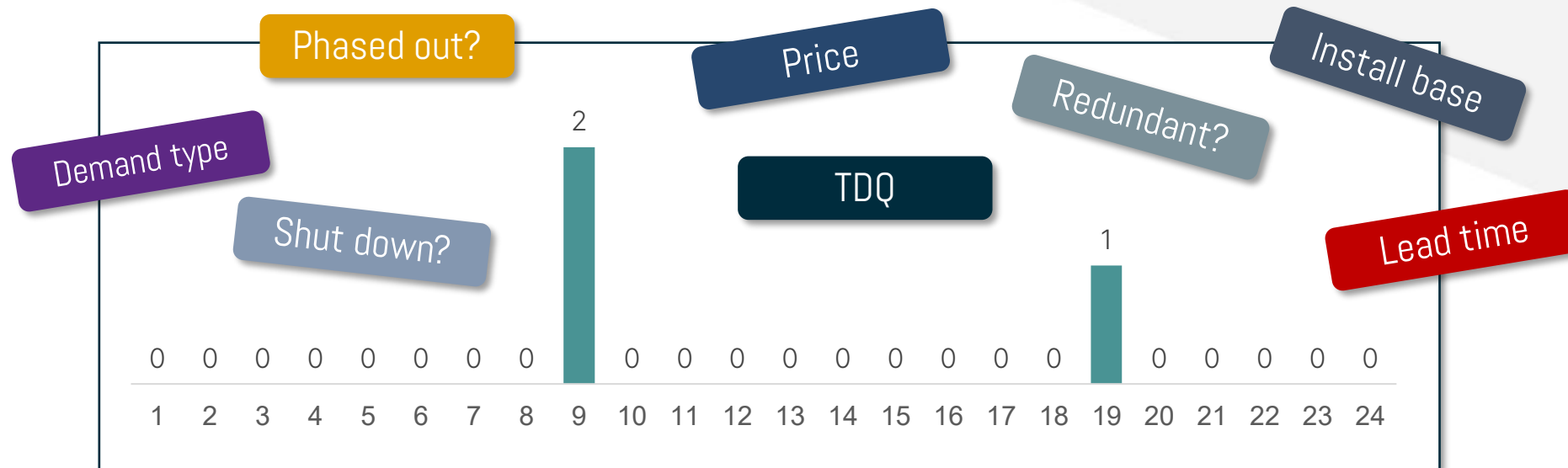
Need for material



3.1 Risk management

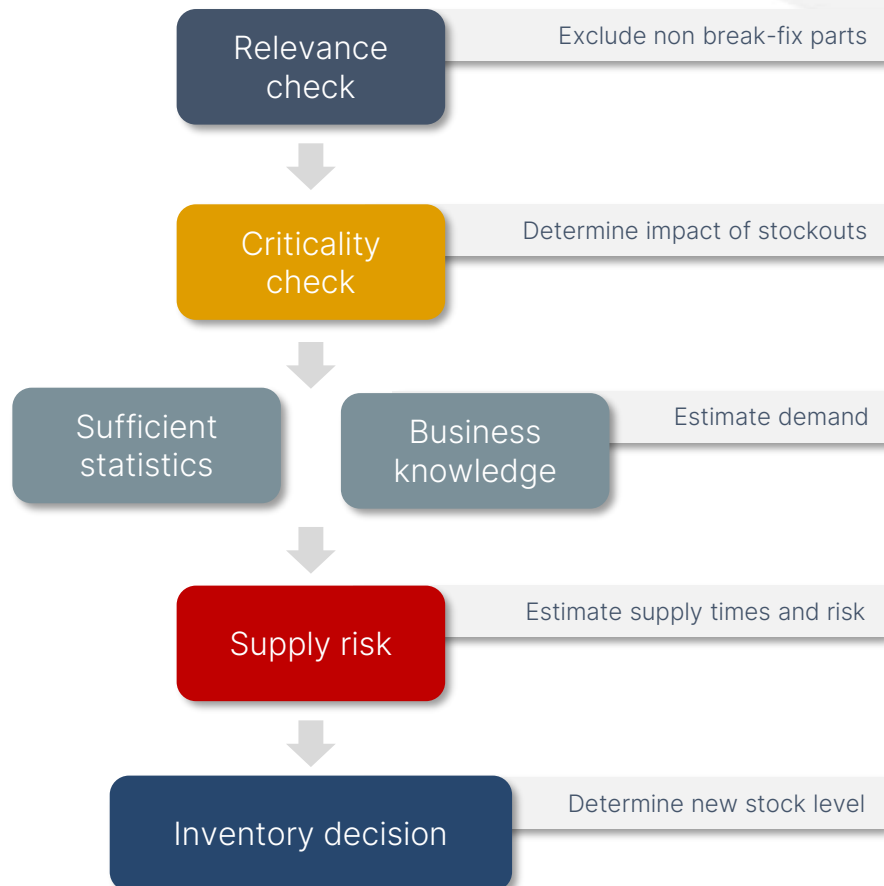
FORECAST BASED ON BUSINESS INFORMATION

How to prevent gut-feel decisions in an area where statistical information is limited?



3.2 Slow moving decision tree

FORECAST BASED ON BUSINESS INFORMATION



Determining the correct inventory level for such parts is often a **collaborative effort** of multiple disciplines.

Companies' setup a **workflow** that guides the relevant stakeholders through these risk questions.

Who's involved

-  Maintenance manager
-  Procurement manager
-  Supply chain manager
-  Inventory controller



3.3 Forecast based on failure driver

EXAMPLE FOR FLYING HOURS

Failure drivers.

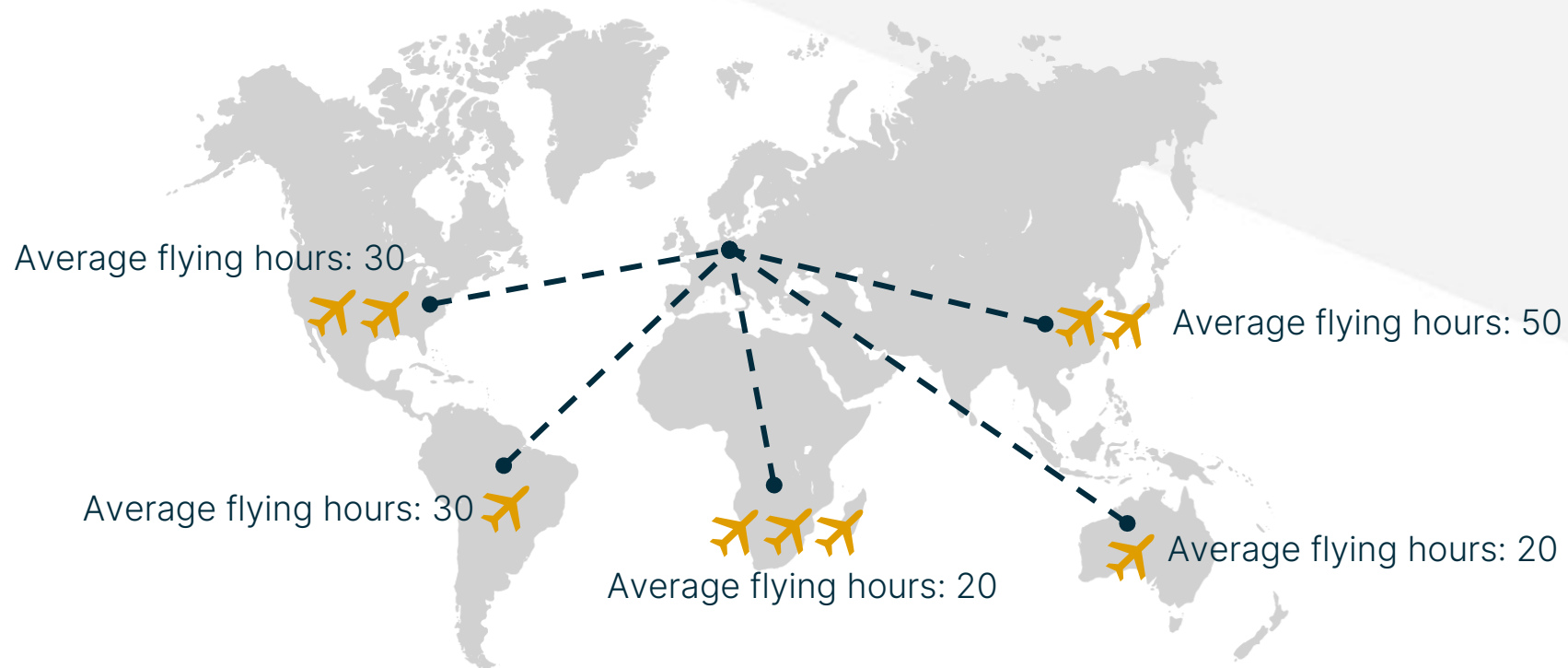


Demand based on a failure driver like flying hours



3.3 Forecast based on failure driver

EXAMPLE FOR FLYING HOURS



3.3 Forecast based on failure driver

EXAMPLE FOR FLYING HOURS



This aircraft has on average 30 flying hours per month

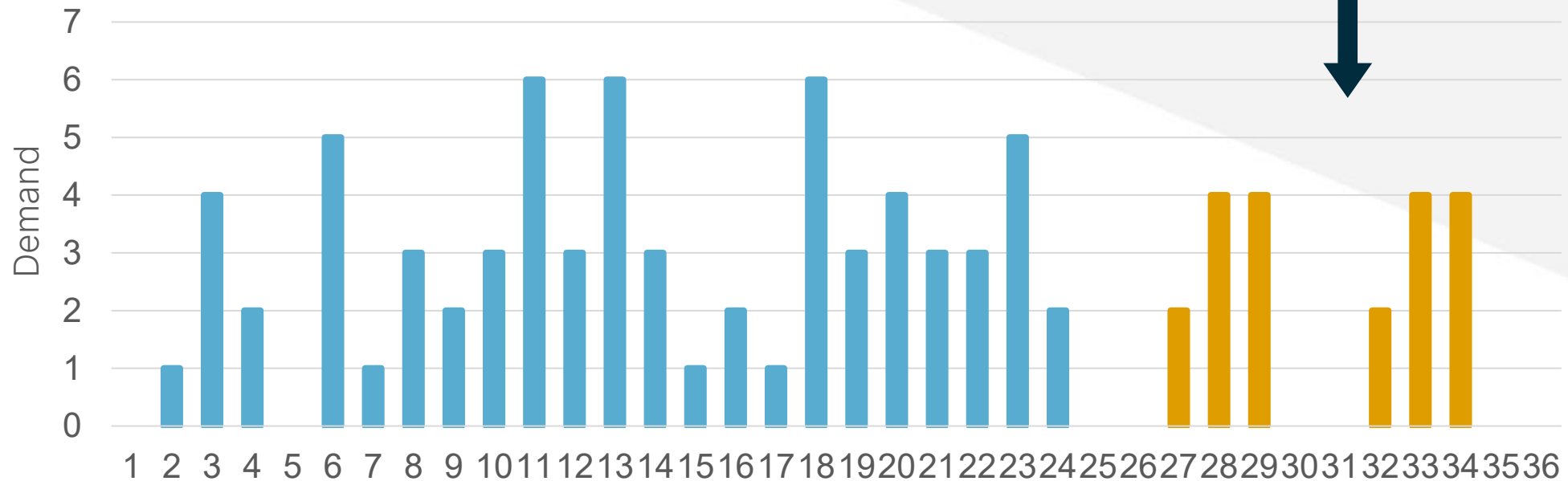
Part A will have a demand after 120 flying hours

Part A requires a new buy after 720 flying hours



3.4 Convert to a MRP forecast you can use

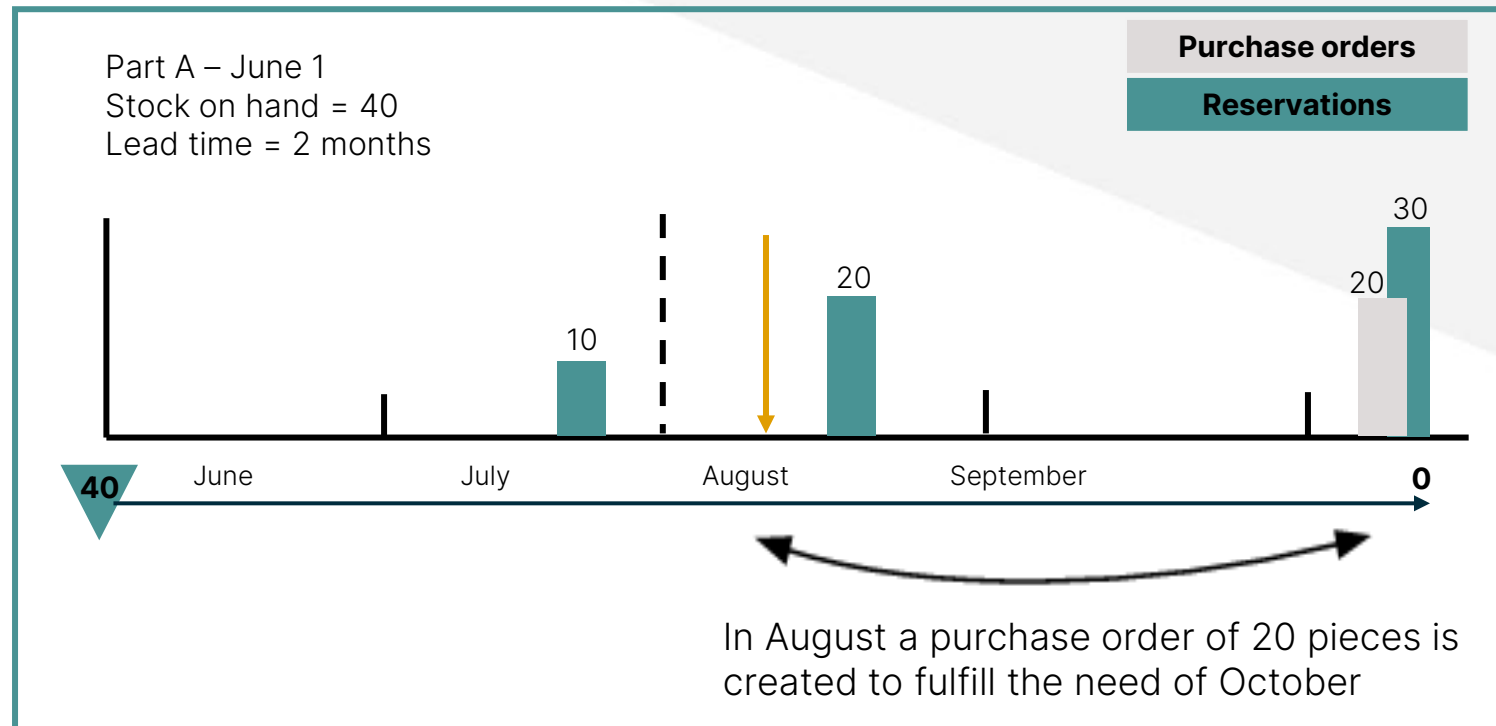
 Convert moments into a MRP forecast



3.5 Demand/MRP driven planning

DEMAND DRIVEN PLANNING

Planned (deterministic) demand: demand is known in advance or can be postponed and should be fulfilled “just in time”.



4. Overview demand forecasting

BRINGING IT TOGETHER

Based on demand history

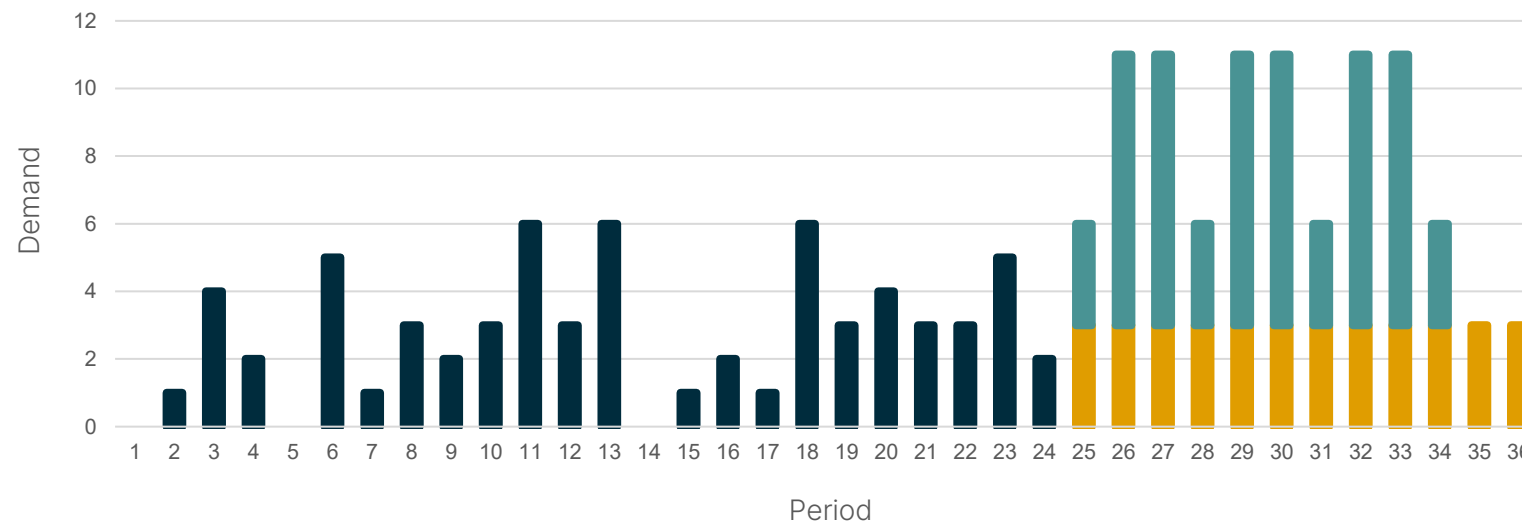
Based on engineering
information

Based on maintenance
planning

Combined forecasting

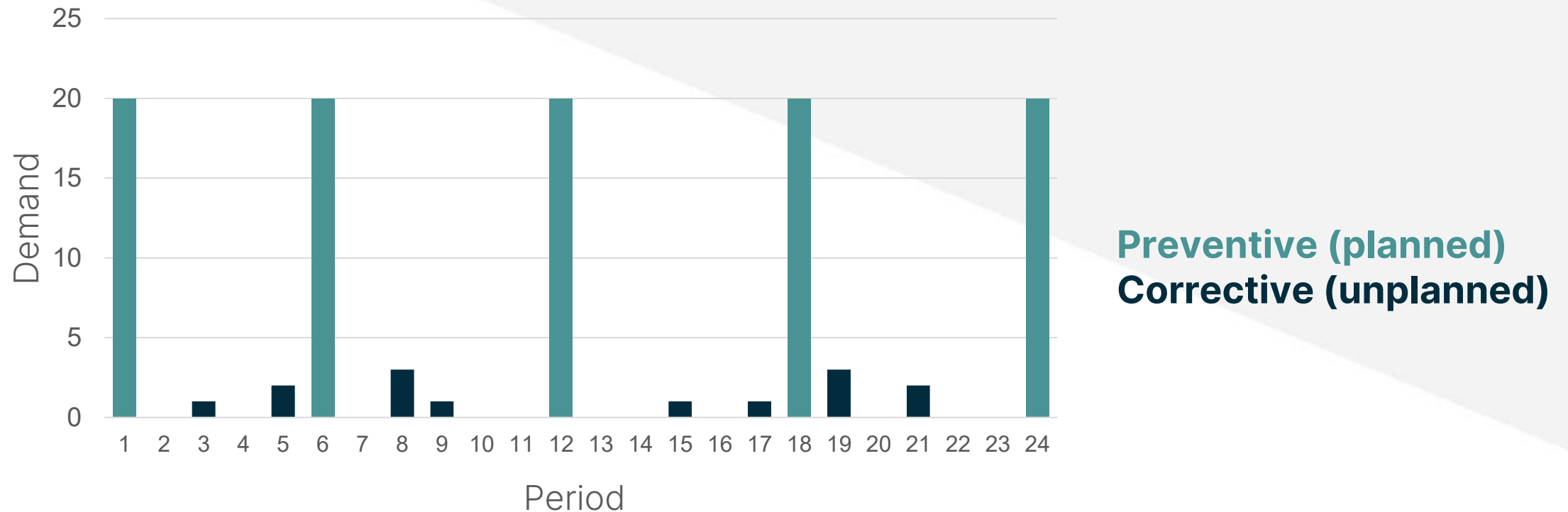
- ✓ Historical demand
- ✓ Planned demand

And this is where it gets interesting...



4.1 Combining demand streams

COMBINING PLANNED AND UNPLANNED DEMAND

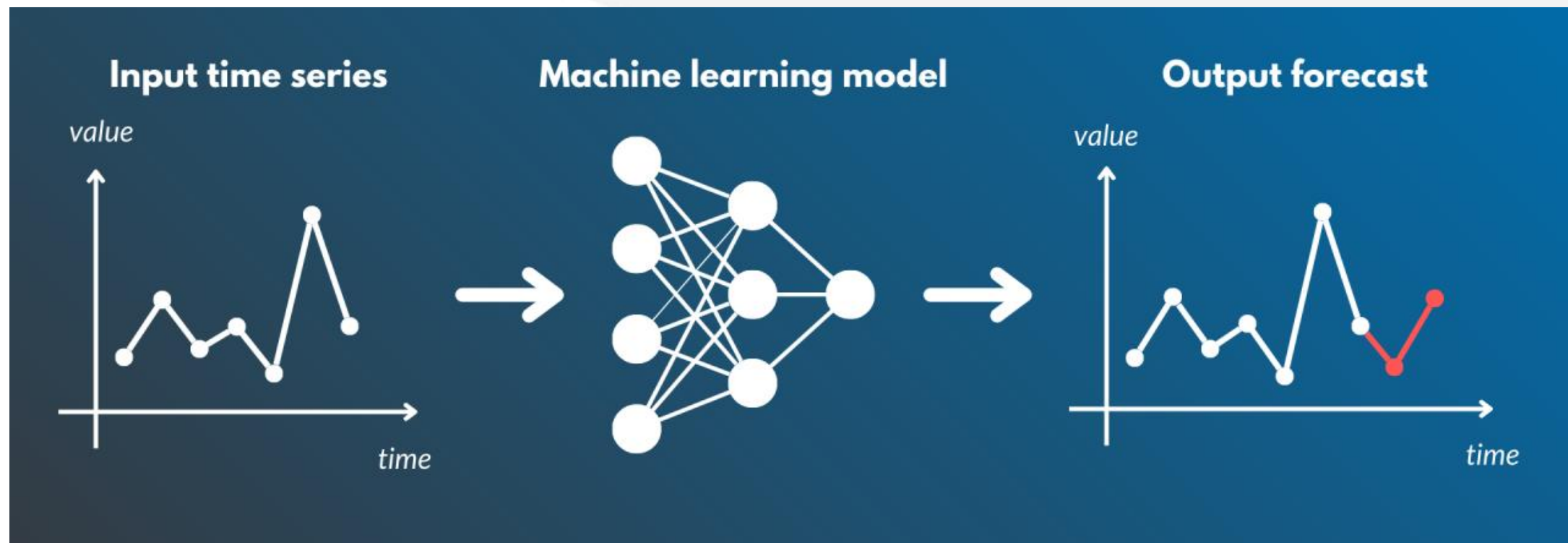


Example of application: maintenance of kits



5. AI forecasting

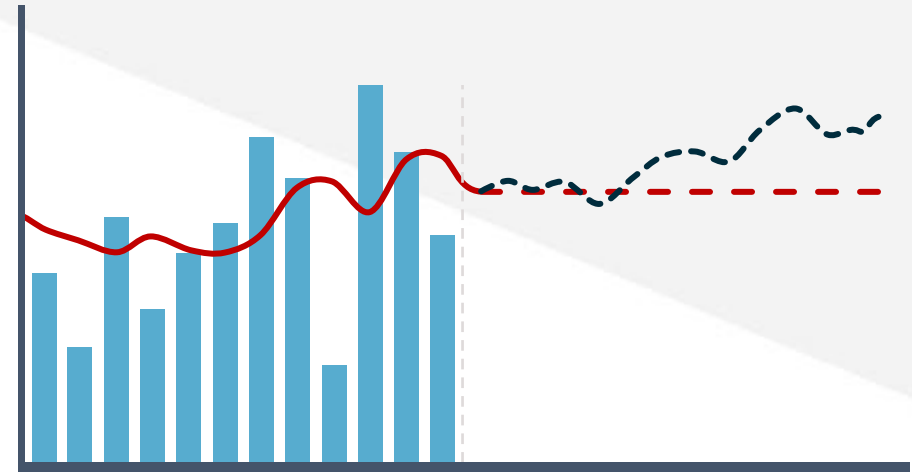
A METHOD THAT WORKS GOOD WITH A LOT OF DATA



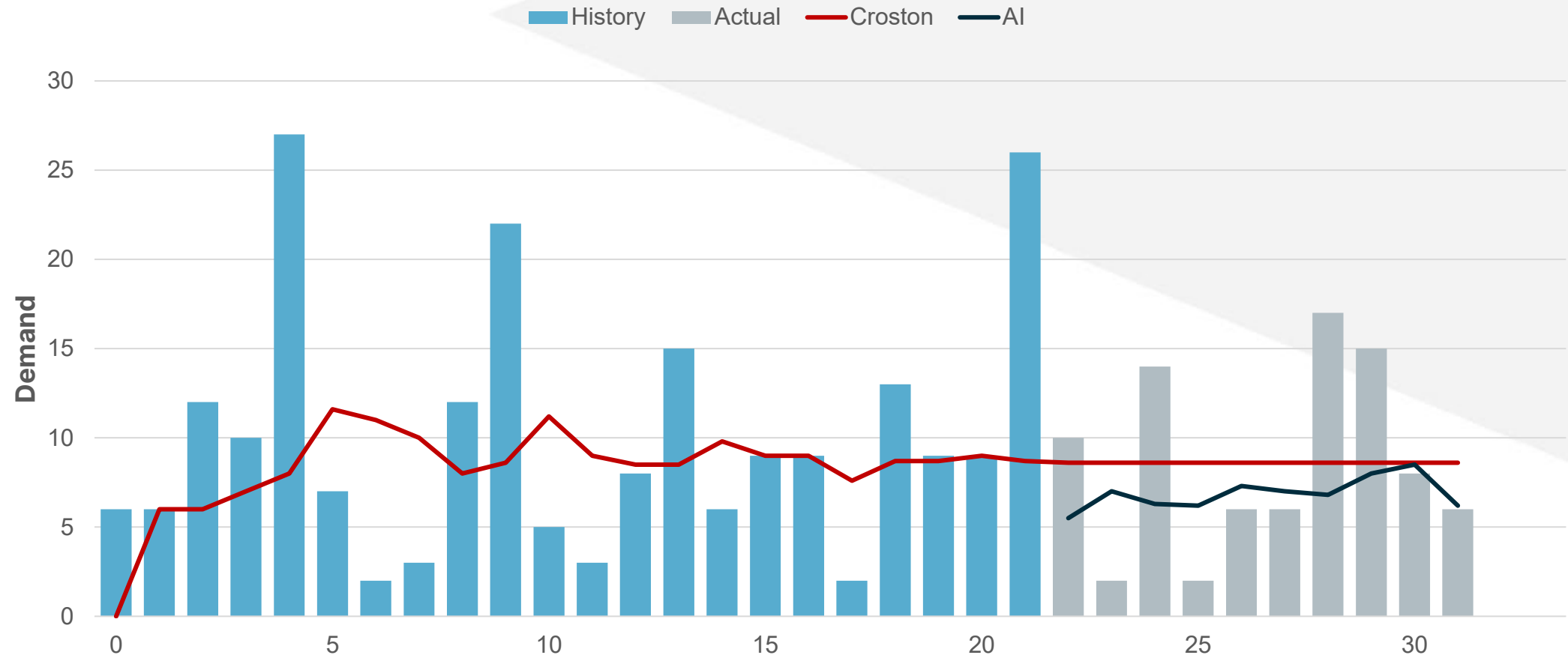
5.1 So – where does AI actually help?

The goal: add something new

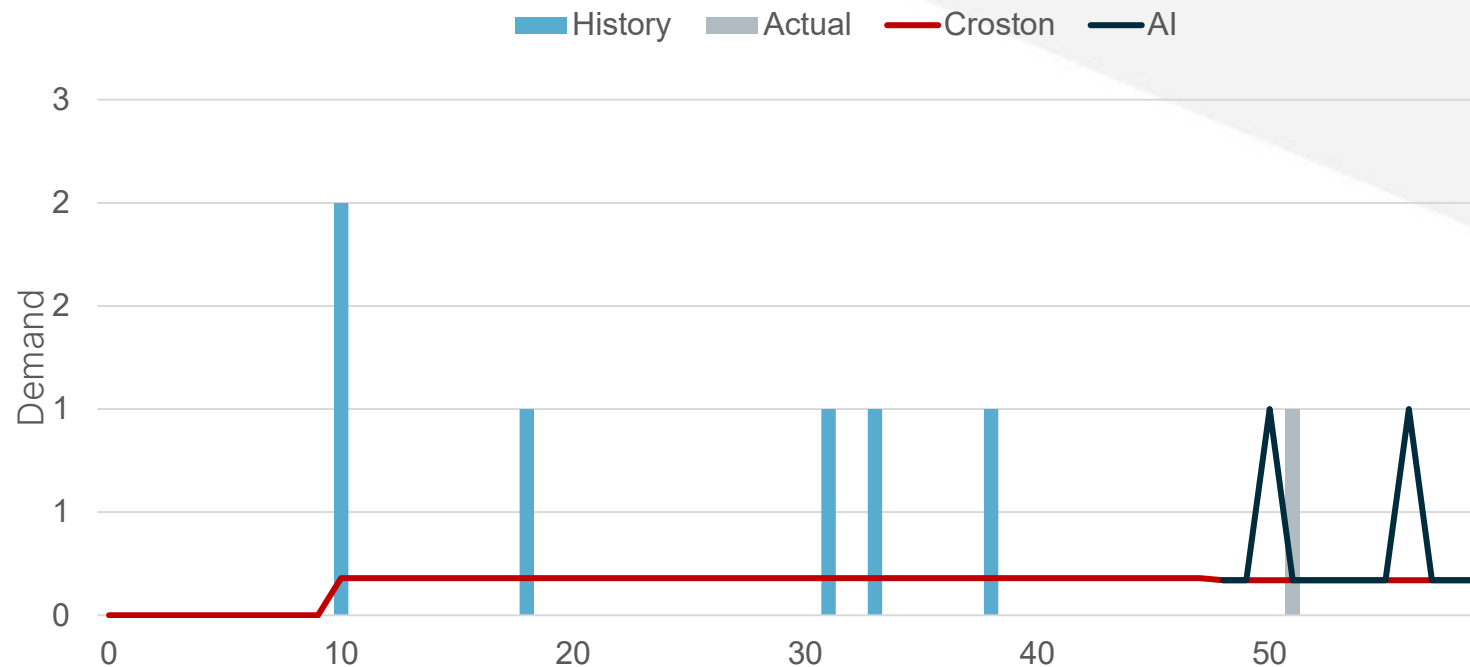
- **Capture demand pattern**
Forecast more than a fixed line
- **Enrich with part attributes**
Part type, price, install base
- **Include external drivers**
Business growth, weather, worldwide events



5.2 An example



5.3 Again, how do we use it?



Even if AI produces a better forecast:

1. What does it change in our **stocking decisions**
2. Can/do we **trust** it?

