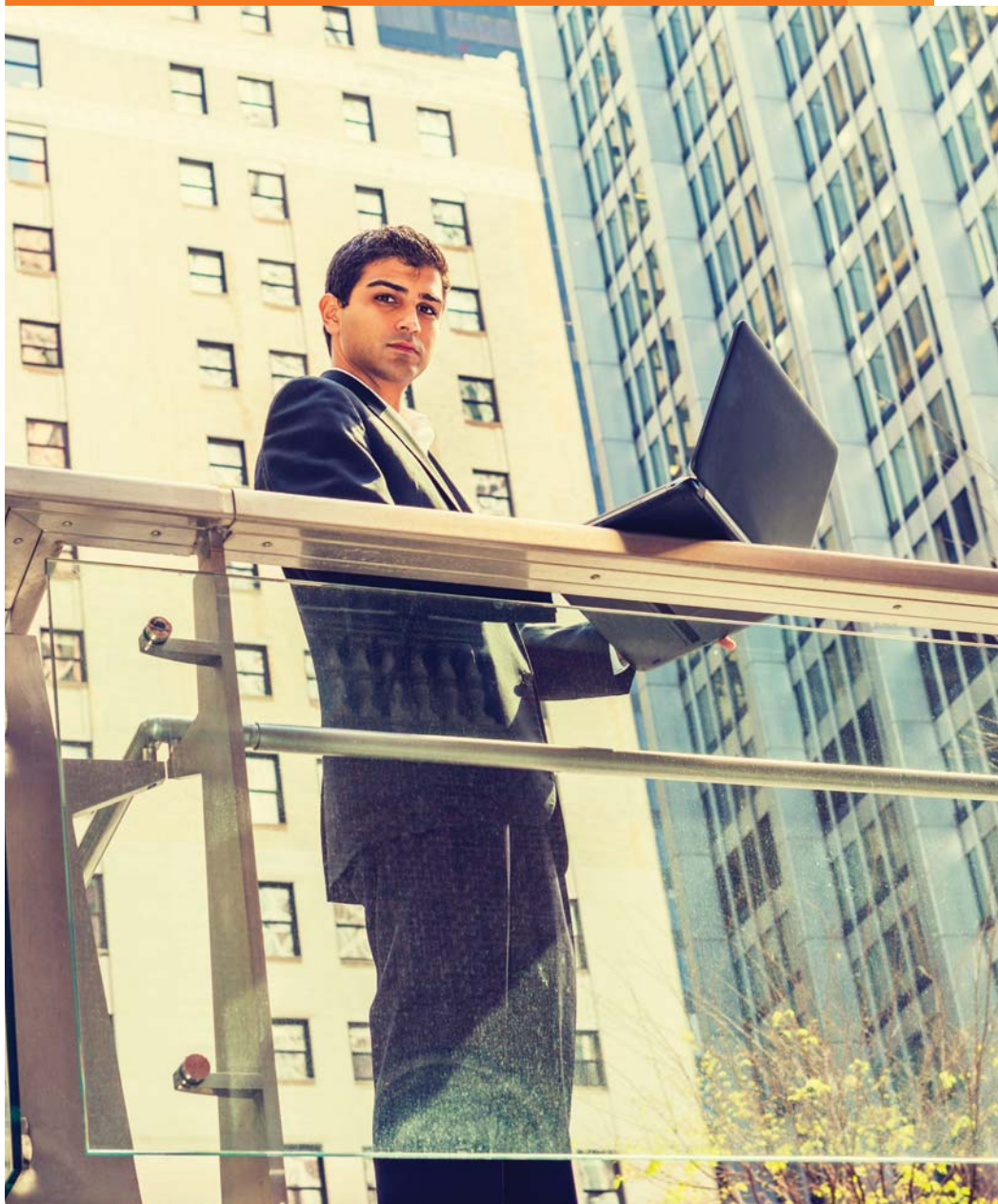
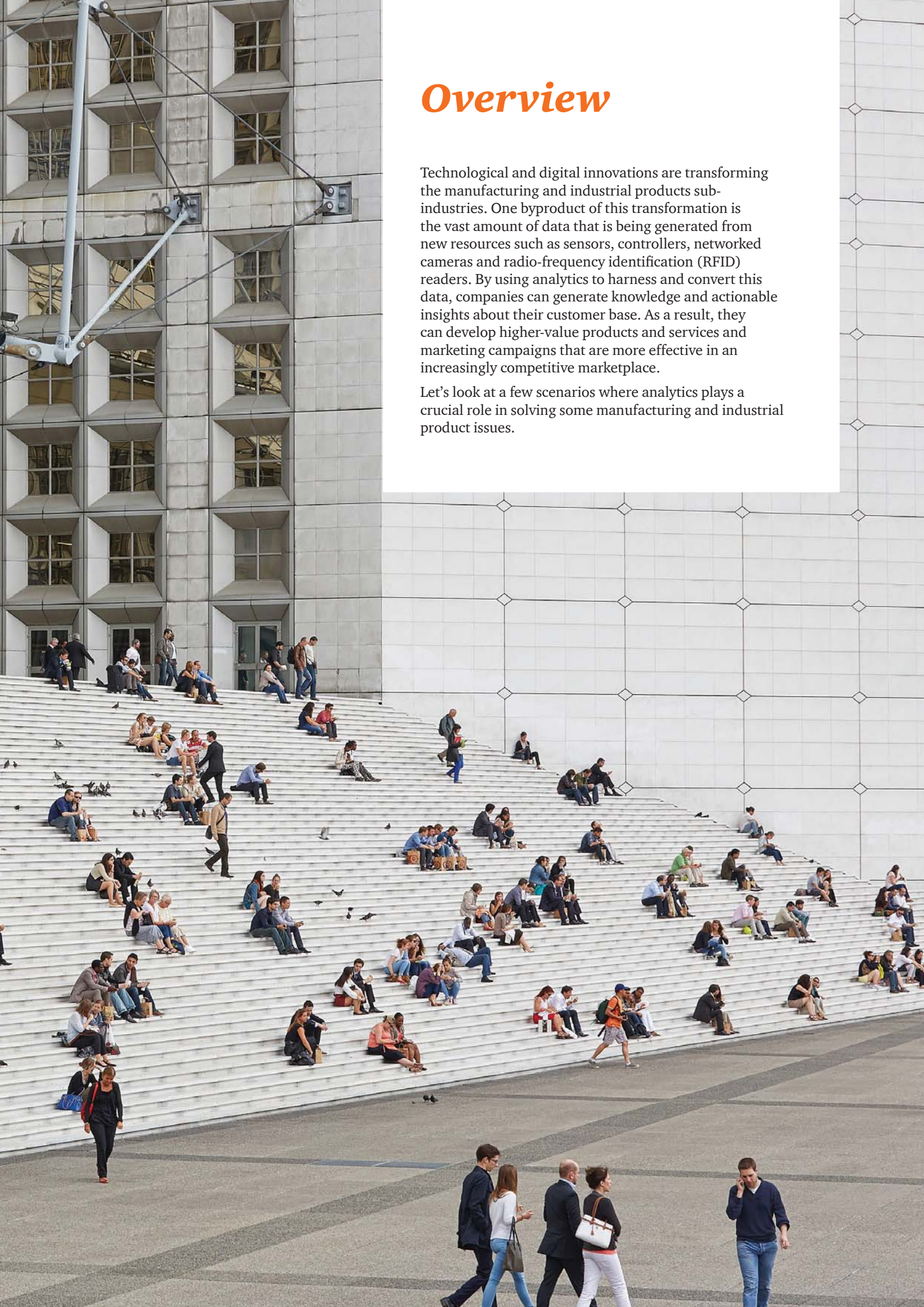


# *Technology Consulting*

Analytics solutions for  
manufacturing and  
industrial products







# Overview

Technological and digital innovations are transforming the manufacturing and industrial products sub-industries. One byproduct of this transformation is the vast amount of data that is being generated from new resources such as sensors, controllers, networked cameras and radio-frequency identification (RFID) readers. By using analytics to harness and convert this data, companies can generate knowledge and actionable insights about their customer base. As a result, they can develop higher-value products and services and marketing campaigns that are more effective in an increasingly competitive marketplace.

Let's look at a few scenarios where analytics plays a crucial role in solving some manufacturing and industrial product issues.

1.

# Demand forecasting

Predicting future vehicle/component demands

## Business challenges

- Identify a scientific methodology to accurately predict future sales volumes of vehicles/components
- Improve target setting for the sales team by identifying current market conditions and their impact on customer demand

## Analytics solution and results

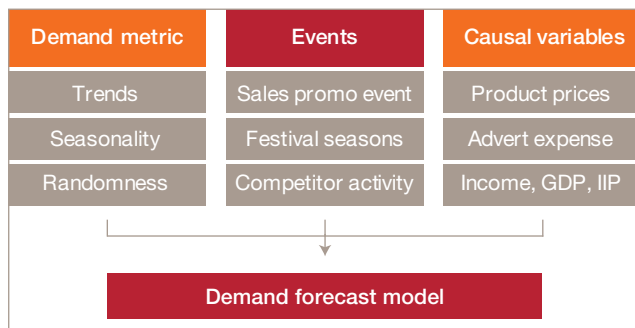
- Develop a robust demand-forecasting model through aggregation and statistical analysis of data
- Develop a structured what-if analysis mechanism to create multiple scenarios

### The results: Improved planning

- Predicted sales volumes based on critical demand drivers
- Improved decision making through structured scenario analysis

## Sample snapshots and reports

- Identify key events, causal factors that impact demand



- Develop model-driven scenario analysis to analyse their impact on demand



# Inventory optimisation

Estimating ideal inventory levels to be maintained

## Business challenges

- Align inventory planning, forecasting and execution capabilities across the organisation
- Obtain insights from vast volumes of data at the SKU location on a weekly/daily level to improve inventory forecasting

## Analytics solution and results

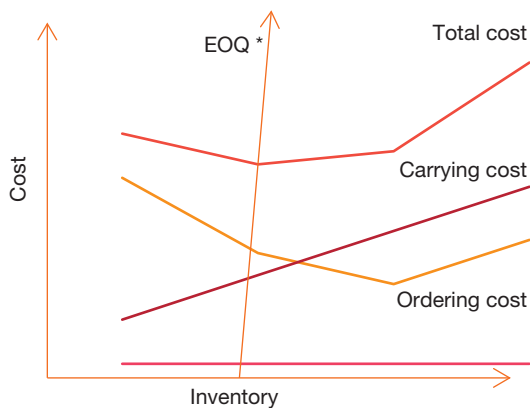
- Employ statistical modelling techniques to perform inventory stock level vs lost sales scenario analysis
- Develop robust demand forecasts through statistical analysis of data across outlets

### The results: Improved inventory management

- Suggested order quantity recommendations to reduce out-of-stock frequency
- Stock products demanded rather than selling what is stocked

## Sample snapshots and reports

### 1 Perform inventory stock vs lost sales scenario analysis



### 2 Optimise inventory levels by taking into account all supply and demand variables



## Pricing optimisation

## Finding the ideal price point for the vehicles/components

## Business challenges

- Understand impact on sales for a given change in price (pricing elasticity) across products, and understand impact on contribution margin
- Ensure a consistent scientific methodology is being applied to pricing decisions across categories/outlets

## ***Analytics solution and results***

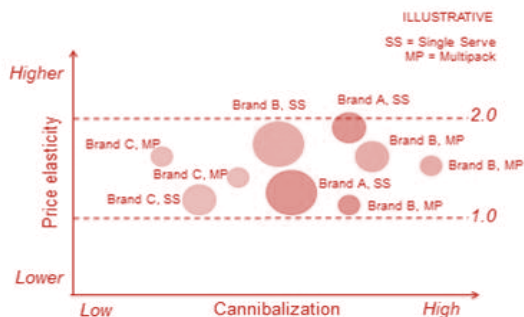
- Build a pricing model to enable an effective pricing structure for various product categories
- Optimise pricing to improve margins and bottom-line profitability

## The results: Improved planning

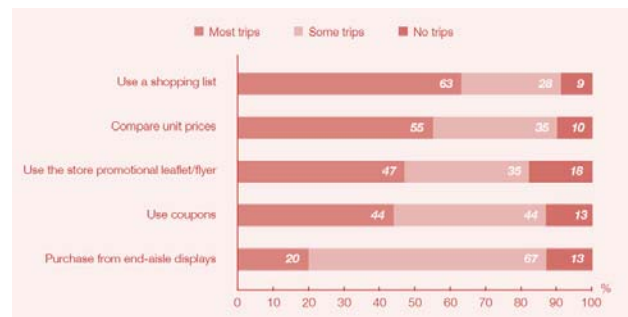
- Data-driven pricing suggestions that drive greater sales and an incremental contribution margin

## Sample snapshots and reports

## 1 Establishment of price elasticity across products



2 Suggest ideal pricing to maximise contribution margin



## 4.

# Predictive maintenance

## Forecasting machinery failure

### Business challenges

- Reduce business disruptions due to unplanned machinery failure incidences
- Prepare a scientific approach for maintenance of the machinery to ensure optimum spend

### Analytics solution and results

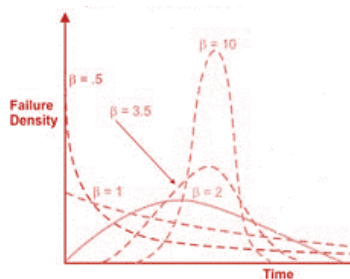
- Build a predictive model using data related to machine performance and downtime history
- Generate and send alerts in case of a likely failure of equipment

#### The results: Reduced machinery downtime and improved overall efficiency

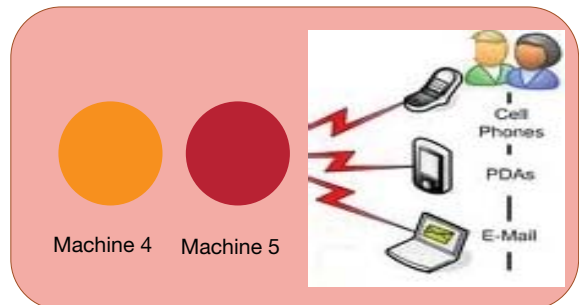
- Provided early warning signals to avoid unplanned downtime
- Detected predictive maintenance activity to help reduce cost incurred due to serious machine failures

### Sample snapshots and reports

#### 1 Detecting machinery performance



#### 2 Sending alerts and early warning signals



# Warranty analytics

Improving the accuracy of warranty forecasts

## Business challenges

- Improve the accuracy of warranty forecasts by leveraging defects and claims data
- Identify and resolve product problems early to avoid warranty claims
- Reduce warranty reserve and addition to the bottom line
- Improve supplier chargeback processes by tracking suppliers of faulty parts

## Analytics solution and results

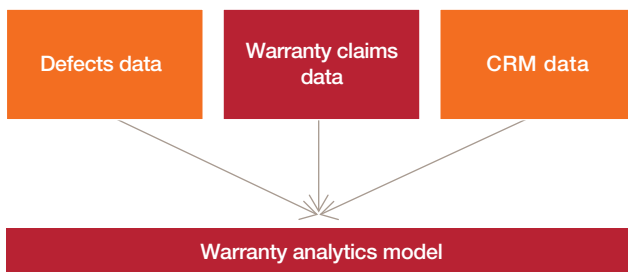
- Analyse the historical defect and claims data to forecast warranty reserve
- Determine fraudulent probability of a claim, detect patterns of fraudulent claim behaviour

### The results: Fewer warranty claims

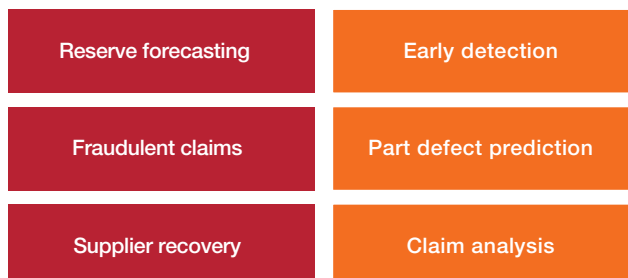
- Early issue detection helped manufacturers reduce repair costs and improve customer loyalty
- Identified the root cause of the claims—whether it was a delivery or production-related issue—and resolved them early on in the product life cycle, leading to fewer warranty claims

## Sample snapshots and reports

### 1 Analysing the defects and claims data



### 2 Making warranty processes more efficient



# Vendor selection model

## Identifying the most suitable vendor

### Business challenges

- Find a vendor evaluation method to facilitate an objective, unbiased selection process
- Identify the key metrics of vendor performance that can help during the negotiation with vendors on specific points
- Finding a robust framework that can measure the vendors' performance

### Analytics solution and results

- The analytic hierarchy process (AHP) is a prominent approach in solving multi-criterion decision-making problems.
- The method allows the incorporation of judgements on intangible qualitative criteria alongside tangible quantitative criteria.

#### The results: A tool for vendor negotiation

- Helped avoid conflicts through collaborative decision making
- Generated a repeatable process that saves time
- Measured vendor performance among peers and across time

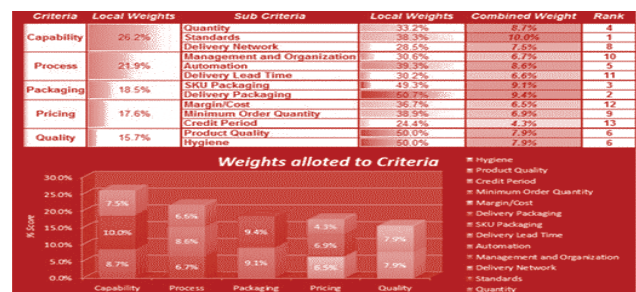
### Sample snapshots and reports



#### 1 Defining and ordering criteria



#### 2 Evaluating vendors and selecting the best



# Production optimisation

Optimising production processes that are inefficient and under-resourced

## Business challenges

- Optimise production processes that are inefficient and under-resourced and maximise production volumes
- Recommend changes in parameters that would lead to maximisation of production

## Analytics solution and results

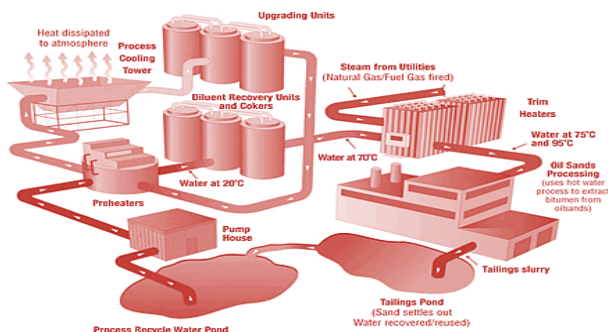
- Use process improvement techniques and data insights, combined with significant industry knowledge, to identify constraints
- Use optimisation to maximise production volume

### The results: Improving production volumes

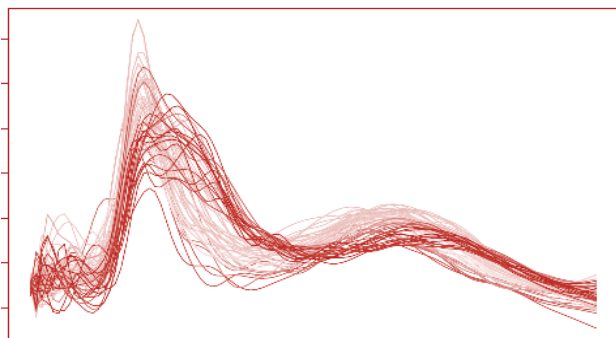
- Maximised production at every stage of the manufacturing process
- Chose various parameters to improve overall production levels of the plant

## Sample snapshots and reports

### 1 Finding inefficient machines/processes



### 2 Optimising production volumes



## Early issue warning

Analysing the defects of raw materials and unfinished inventory quickly

### Business challenges

- Analyse the defects of raw materials and unfinished inventory to quickly predict any potential issues during refining operations

### Analytics solution and results

- Develop a logistic regression algorithm that can take into consideration various characteristics of the raw material and unfinished inventory, and predict the likelihood of any potential issues during the refining process

#### The results: Early issue identification

- The results of the solutions can be used to take immediate action and to avoid any problems in the future based on the likelihood of recurring issues.

### Sample snapshots and reports

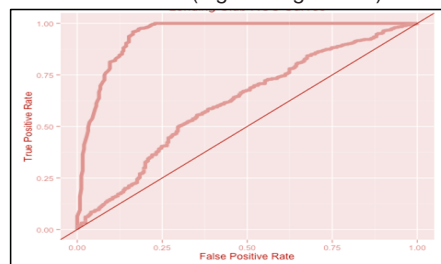


#### 1 Various thresholds are defined to assign severity levels

| Failure likelihood | Severity level     |
|--------------------|--------------------|
| More than 0.5      | Critical           |
| 0.35 to 0.         | Severe             |
| Less than 0.6      | No action required |

#### 2 Predict the likelihood of issues that impact the refinery process

ROC curve (logistic regression)



# Service parts optimisation

Ensuring availability of spare parts when required

## Business challenges

- Improve the availability of spare parts across the service network of the organisation
- Reduce stock-outs and back orders which lower customer confidence and create a negative brand image

## Analytics solution and results

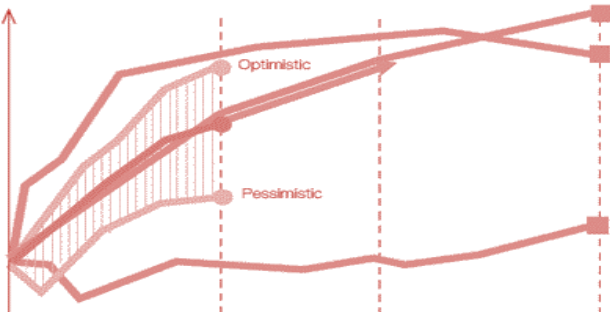
- Predict the demand for spare parts in the future using a service parts optimisation model
- Identify the optimum inventory levels required across the network

### The results: Reduced spare parts stock-outs and improved customer satisfaction

- Charted out the policy for optimum inventory replacement
- Reduced excess inventory carrying cost as well as incidences of stock-outs

## Sample snapshots and reports

### 1 Forecasting spare parts requirements in the future



### 2 Suggesting optimum inventory levels

| Product      | Reorder quantity | Reorder level | Lead time | Available quantity |
|--------------|------------------|---------------|-----------|--------------------|
| Clutch pedal | 25               | 28            | 5         | 20                 |
| Brake oil    | 40               | 20            | 2         | 10                 |
| Bumper       | 50               | 20            | 10        | 9                  |



# Cost of service optimisation

Faster resolution of service-related issues

## Business challenges

- Reduce cost and effective anticipation and planning of aftersales service requirements
- Improve overall customer satisfaction by providing services in a timely and efficient manner

## Analytics solution and results

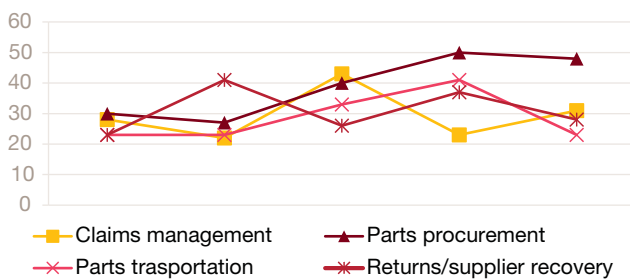
- Study customer complaint patterns and identify the root cause of the problems using an analytical model
- Forecast the services and components required for servicing the customer and optimising the total cost incurred

### The results: Improved customer experience

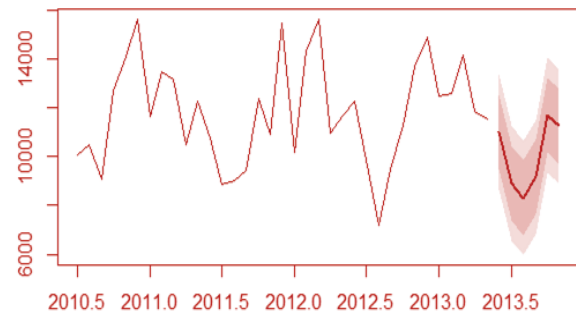
- Reduced the time taken to service a vehicle, leading to the servicing of a greater number of vehicles
- Reduced the overall cost of servicing due to improved planning

## Sample snapshots and reports

### 1 Finding service driver patterns



### 2 Optimising service drivers



PwC can help you deal with all of these and other challenges through the use of analytics, allowing you to have access to information quickly and accurately and in formats that will enable you to make meaningful business decisions in real time.

## Why PwC?



### Strong sector expertise

Our consultants have a proven track record of working with leading providers in India and have strong domain knowledge in the manufacturing and industrial products space.



### Scalable, flexible and cost-effective offerings

Our analytics solutions can be customised as per a provider's specific needs across areas.

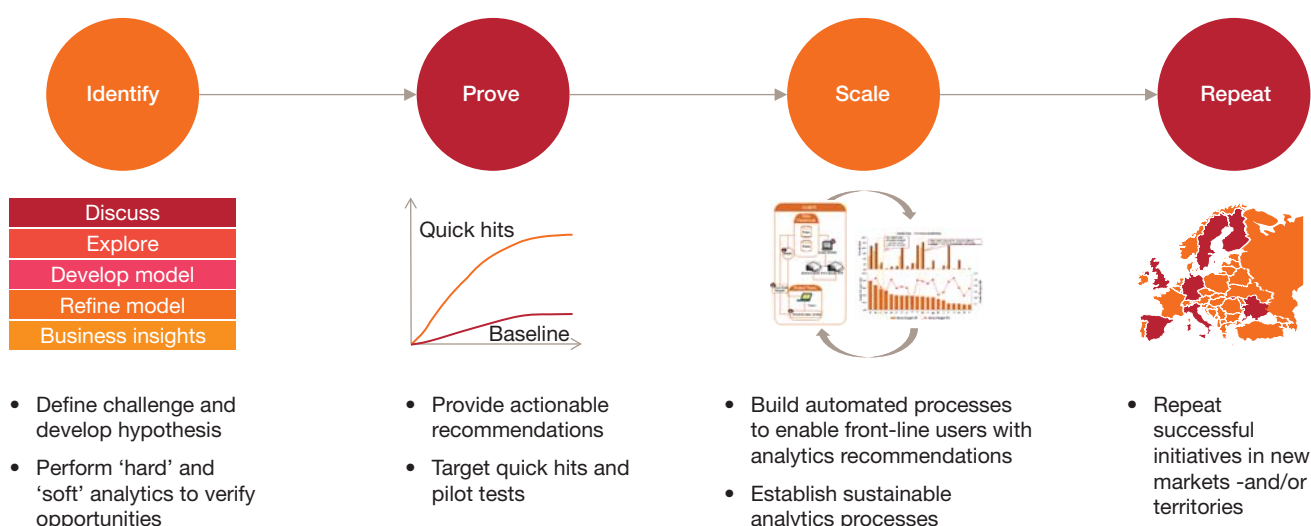


### Cutting-edge technology

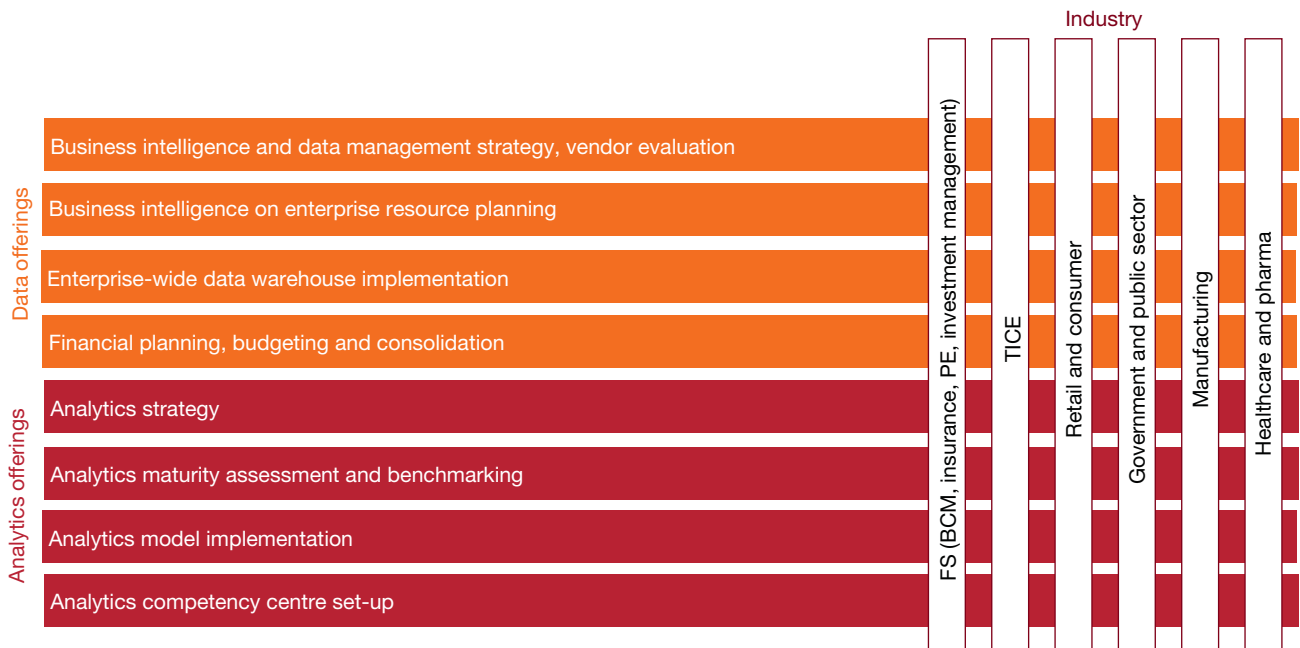
We have expertise in implementing manufacturing and industrial products analytics through leading market tools by aligning them to the client's technology landscape.

## The PwC approach to advanced analytics

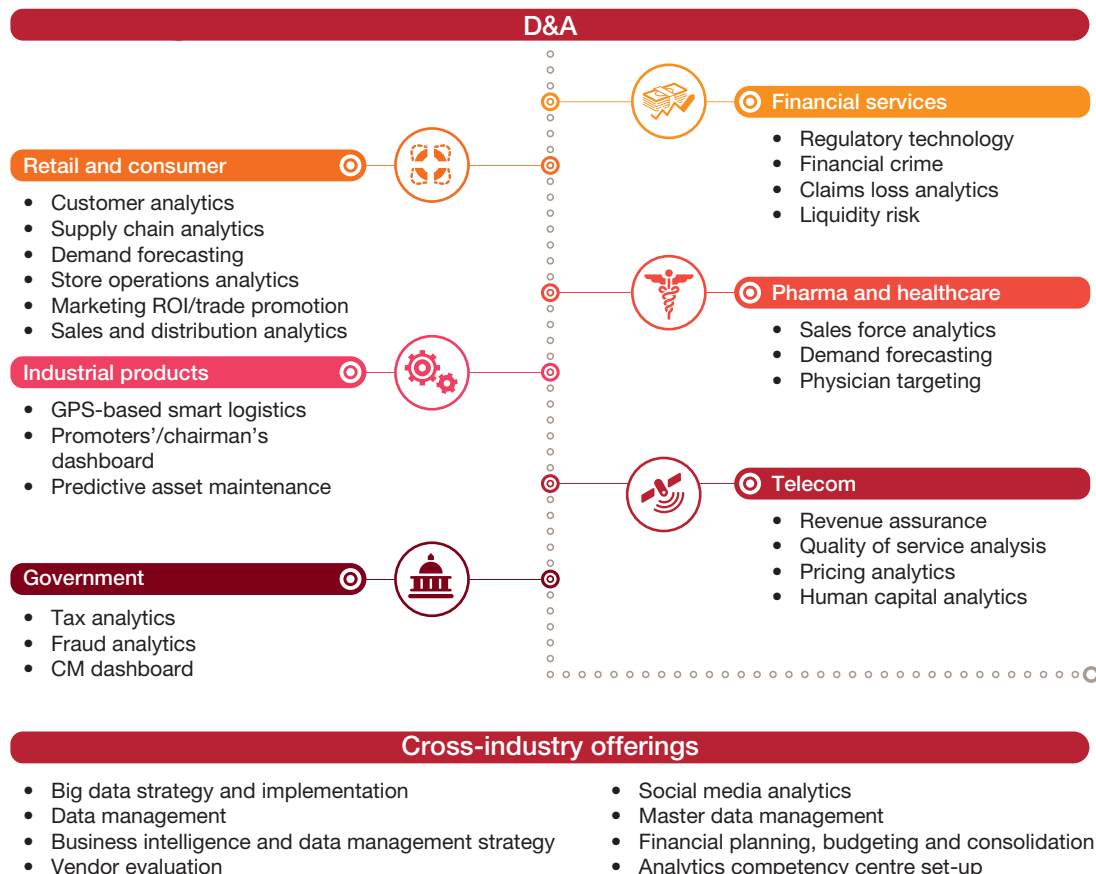
PwC's approach constitutes a well-defined process of using analytics to identify opportunities for value creation, demonstrate quick wins and scale solutions to meet the needs of the business.



# Out Data and Analytics offerings



## Data and Analytics key industry-wise services



# About PwC

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