

# Analytics

## Introduction

Analytics is a term used to define the processes and methods applied to data. The insight gained can be used to describe, predict and improve organisational performance. It is about exploring and discovering patterns within data with the aim of providing insight. These insights provide a greater depth of knowledge about an organisation, placing managers in a stronger position to monitor activity and take informed decisions.

Ideally analytics should be conducted within an optimised infrastructure that is tailored towards business intelligence and analytics. This means that data should be accurate, current, consistent and available, preferably stored in a structured, well-documented and accessible place, i.e. a data warehouse. The effective deployment of analytics has the potential to be a key differentiator between organisations.

Analytics is about more than reporting. Reporting is focused on displaying what has happened, whereas analytics is also about why it has happened and what will happen. Broadly-speaking, analytics can be broken down into three categories: past, present and future. See diagram below:

	Past	Present	Future
Information	<p><b>Reporting</b> <i>What happened?</i></p>	<p><b>Alerts</b> <i>What is happening now?</i></p>	<p><b>Plans</b> <i>What should happen?</i></p>
Insight	<p><b>Statistical modelling</b> <i>Why did it happen?</i></p>	<p><b>Scenario modelling</b> <i>What is the best action?</i></p>	<p><b>Forecasting</b> <i>What may happen?</i></p>

## Past

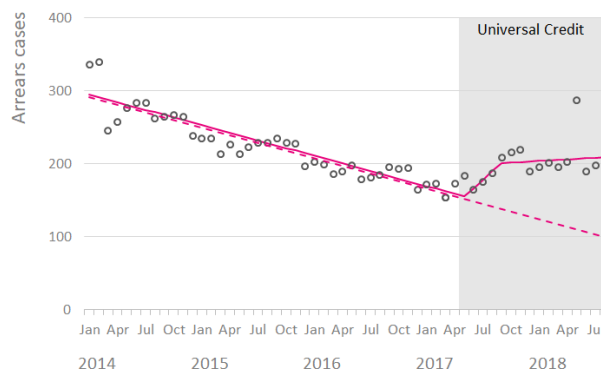
### Descriptive Analytics

The most fundamental form of analytics, descriptive analytics, is about describing data and contextualising what has happened. It involves summarising information at various levels of aggregation (e.g. geographies, organisational structure, time) using statistical techniques, such as sums, ranks, averages, measures of variability, percentage changes and so on. Descriptive analytics is normally the starting point in analytics, as it tends to raise questions about the data that drives further analysis.

### Statistical Modelling – Hypothesis Testing

Questions naturally arise from data as outliers and changes are observed. Hypothesis testing is a method of finding out whether unusual behaviour may have happened by chance or whether it is likely to be significant.

For example, it may be desirable to explore the impact of Universal Credit on arrears. The graph below shows the long-term decline in the number of tenants in arrears, and the effect of the introduction of Universal Credit. The analysis can quantify how much the change has led to a rise in arrears.



Other challenges might be the relationship between repairs and length of tenancy or the age of tenant, or the possible link between anti-social behaviour and turnover.

Irrespective of the question, the most appropriate statistical techniques for any specific situation should be used and results communicated in a way that is most suitable to the audience – either in a report, a presentation or dashboard.

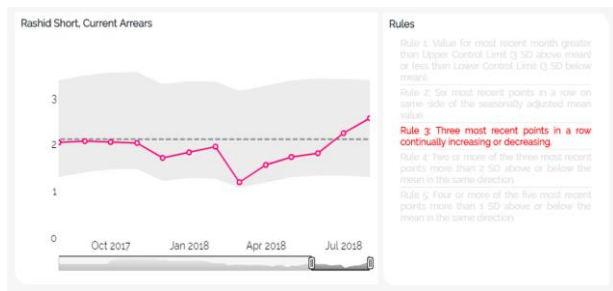
## Present

### Alerts

Rather than simply looking at the past, alerts focus on what is happening *now*. There are two main types of alerts, based on values and changes.

Value alerts can be generated by simply ranking those KPIs (at an appropriate level of disaggregation – for example income officers or area offices), that are furthest from appropriate targets or average values.

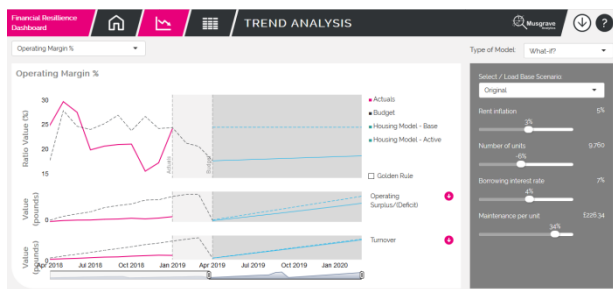
Change alerts can be generated by statistical process control (SPC), an automated technique that uses control limits (based on average and standard deviation) to differentiate expected from unexpected behaviour and a series of rules that, if broken, produce alerts. The grey area in the diagram below shows 'normal' or expected performance and change is evaluated against that.



### Scenario Modelling (Stress Testing)

The aim of scenario modelling is to explore the outcome of various options in the future. It is helpful for assessing risk and answering 'what if?' questions. For example, what would my operating margin look like if arrears or voids were to increase five percent? This information is best communicated in a dashboard where the user can adjust parameters on the fly with sliders and the results are visible immediately. It relies on having a model of how the business, or part of the business, works.

This model might be a financial model linking internal factors such as rent collected, voids and repairs and external factors such as inflation and interest rates with the income and expenditure accounts. Based on this model, it is possible to anticipate changes in key ratios such as the operating surplus. This enables the business plan to be stress tested. The diagram below illustrates a dashboard that delivers real-time financial scenario modelling.



Other models can be developed via statistical analysis, based on the relationship between variables, such as age of tenant and rent arrears. Where a causal relationship has been accurately determined, via hypothesis testing, scenario modelling can then be developed.

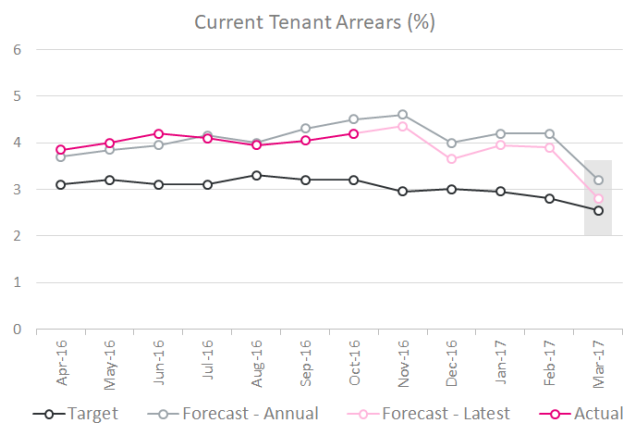
## Future

### Predictive Analytics

Analytics can also be used to make informed predictions about the future based on what has previously occurred. This means being more *proactive* than *reactive*. Classification is a method for predicting categorical or binary variables. After selecting features with predictive significance, accurate models can be constructed that assign new data points to a particular class. This can be used to predict whether a tenant is likely to fall into arrears, or whether a property is likely to become void.

### Forecasting

Similarly, to predict what will happen to KPIs over time, forecasting can be done based via time-series analysis. This method can be used to forecast KPIs such as arrears (see example below). Time series analysis works by decomposing data into three components: seasonality, trend and the remainder. When each of the three components are calculated, as accurately as possible, forecasts can be generated and presented to decision makers.



A major advantage of deploying forecasting is to avoid unnecessary concern about a KPI which is significantly above target at one time of the year when it is forecast to return to target later.