



Evaluating Predictive Analytics for Capacity Planning

**HIC 2015
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MCKESSON

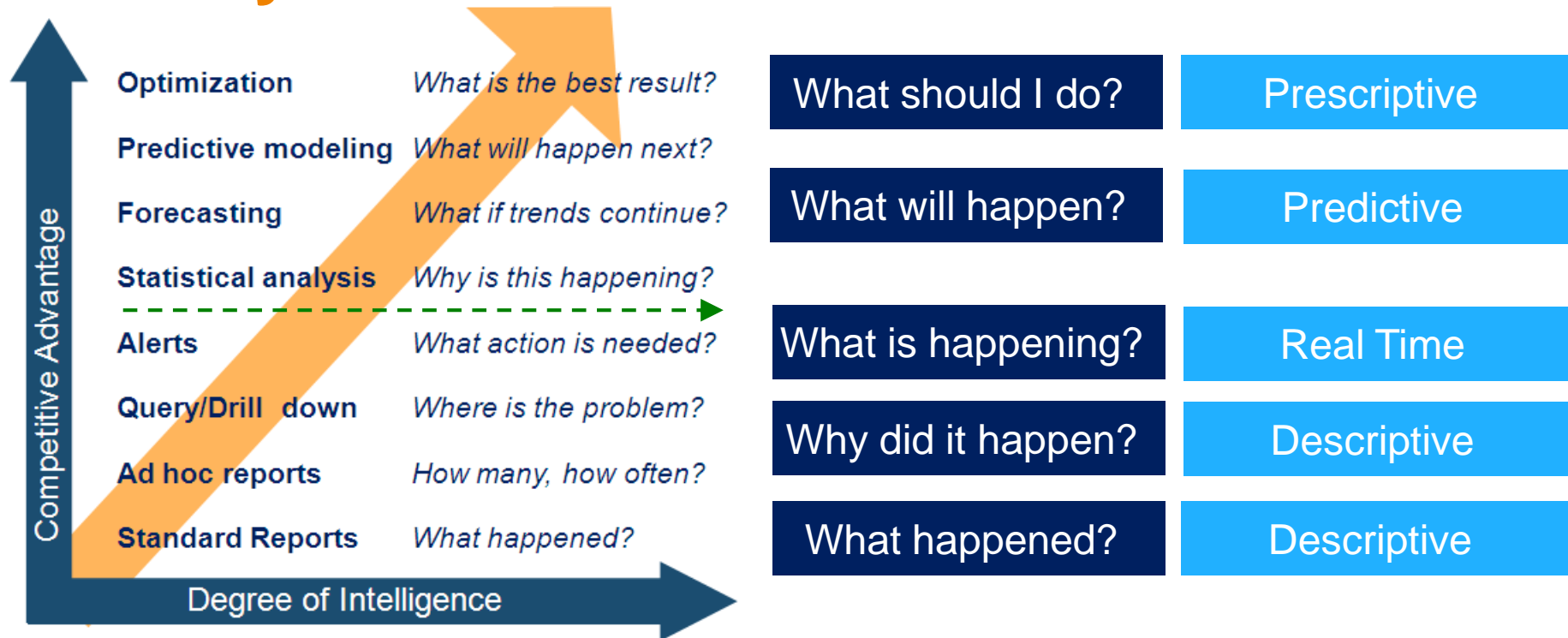
Change the view.

What is predictive analytics?

Predictive analytics is the practice of extracting information from existing data sets, and then applying various techniques (eg, statistical, modelling) in order to determine patterns and predict future outcomes and trends.

How can we practically evaluate and use predictive analytics solutions for capacity planning within health?

Paradigm Shift Required for Analytics Maturity



Sources:

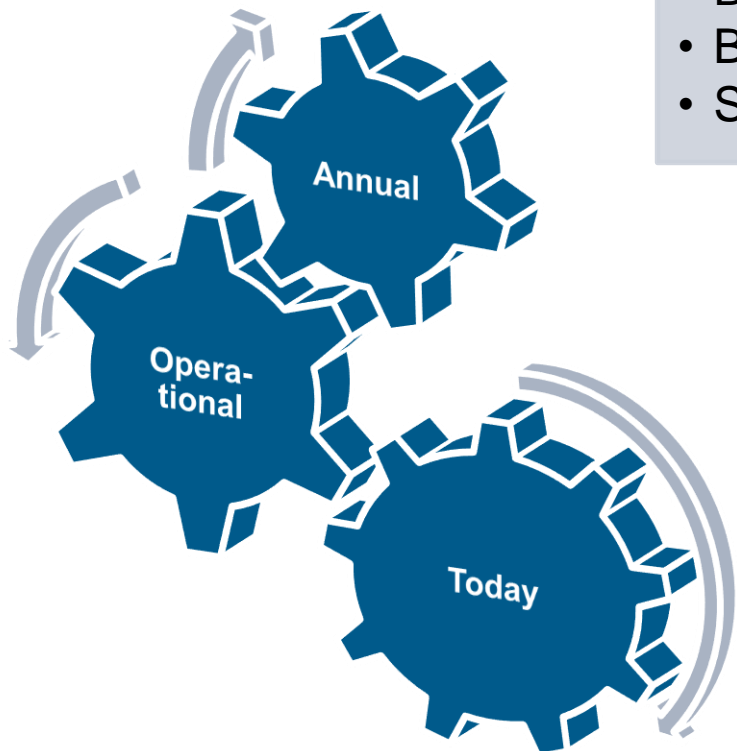
Competing on Analytics, Tom Davenport

Gartner IT Glossary

What to look for with Capacity Planning



1. Manages multiple planning horizons
 - Multi-year, annual, 6-8 week scheduling periods, weeks, days and hours
2. Continuously updates forecasts
3. Forecasts patient demand with consistently high absolute accuracy vs. stated accuracy % aggregated over time
4. Forecasts volumes for door-to-door patient flow vs. preset intervals and departments
5. Converts forecasts automatically into capacity and staffing needs
6. Supports user insight, input and adjustment as part of the planning process



Strategic & Annual Planning

- Discuss “what-if” options, regional plan
- Budget and physical capacity decisions
- Set targets and assumption (linking plans)

Monthly & Weekly Planning

- Manage “current” variation to plan
- Update forecasts & roster staff
- Informed decision making

Daily Planning

- Unit focus: manage current & projected pts.
- Focus on relieving immediate flow issues
- Replace sick leave? Book casual

Forecasting Methods Used for Operational Planning



Predictive modeling

Algorithmic modeling

Pattern identification

Scenario modeling

Simulation

Optimization

Predictive



Determining, mathematically, the relationship between the *explanatory* variables and the *predicted* variable, based on historical data

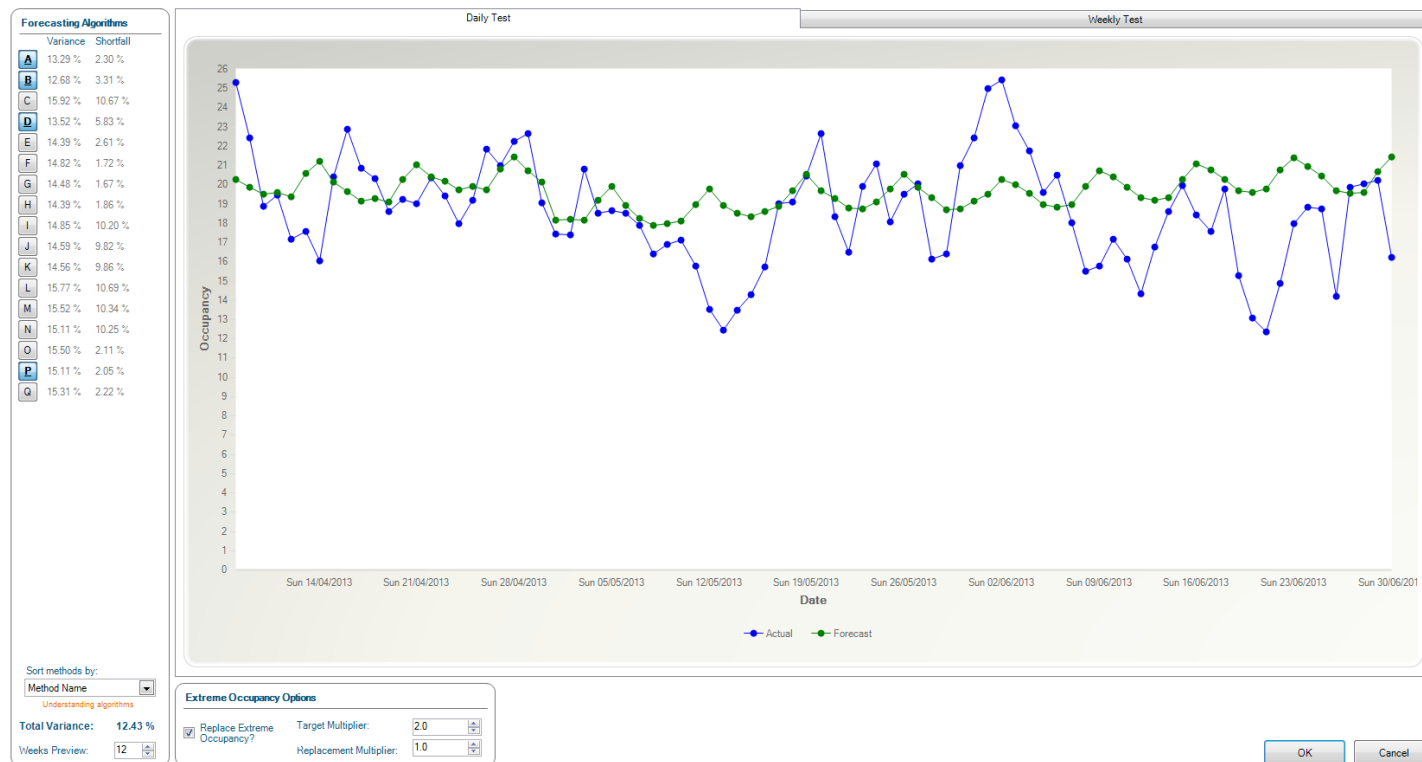
Examples:

Insurance: relationship between certain characteristics of a person and lifestyle and predicted outcome of a certain claim

Capacity Planning: relationship between status of ED at a given time of day and the impact on Inpatient beds tomorrow

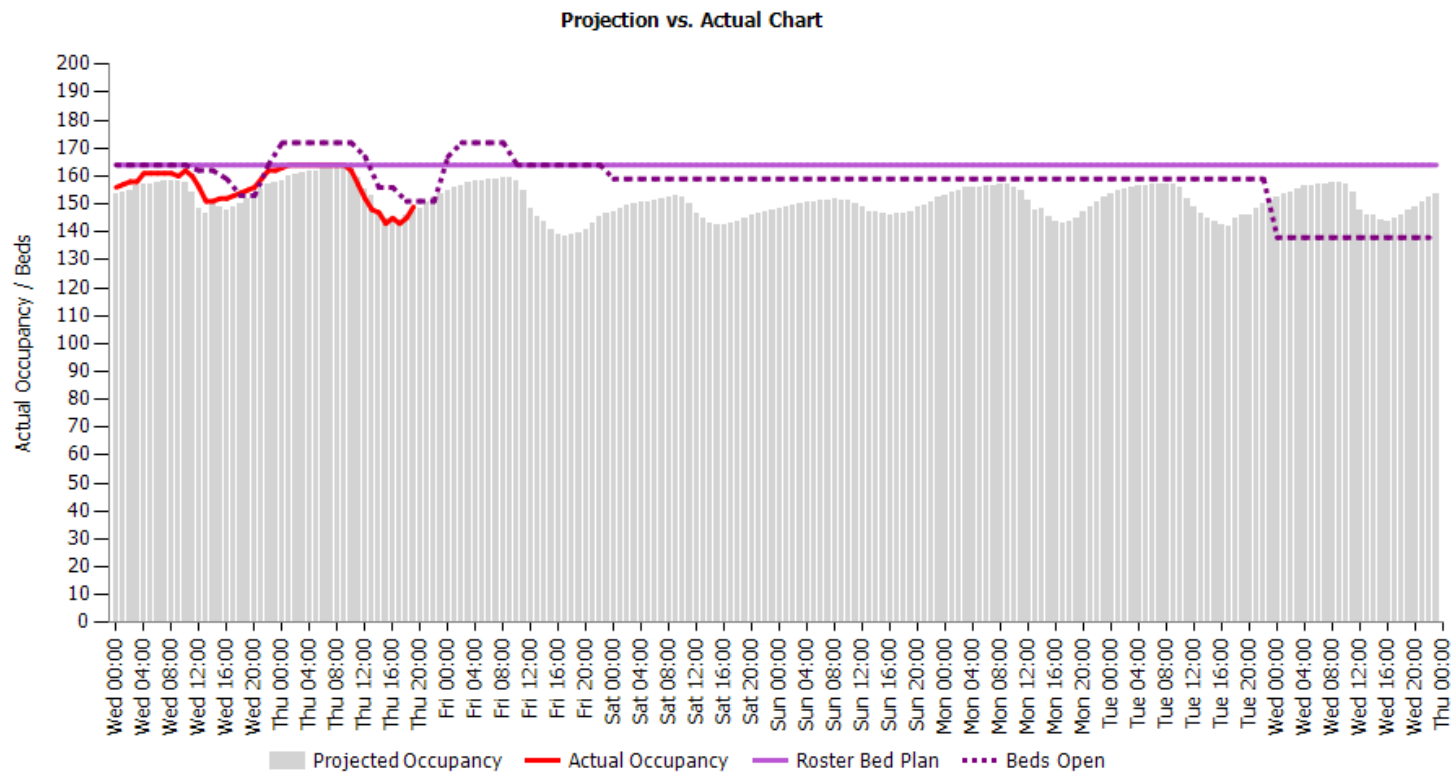
Pattern Identification

'Time series forecasting' identifies different patterns within the predicted variable itself, such as trend, seasonality and day of the week. Various combinations of those patterns can then be used to derive a forecast



Algorithmic

Take recent averages and distributions of past activity for certain locations, services and day of the week or special event days. Then apply an algorithm to utilize these to create a projection



Scenario

Allow users to input their own assumptions or 'what ifs' into the prediction to assess impacts (vs. based purely on patterns of past activity)

	Annual Census			Annual Patients In			Annual Patient Turn		
	2012	2013	2014	2012	2013	2014	2012	2013	2014
Hospital Total	145,201	150,721	151,870	25,756	28,384	30,308	5.6	5.3	5.0
Emergency	122,548	130,929	133,984	20,201	23,016	25,266	6.1	5.7	5.3
Scheduled	22,653	19,792	17,887	5,555	5,368	5,042	4.1	3.7	3.5
ICU	4,229	4,984	5,546	560	764	787	7.6	6.5	7.0
Emergency	4,113	4,509	5,304	543	727	756	7.6	6.2	7.0
Scheduled	115	475	242	17	37	31	6.8	12.8	7.8
Cardiac ICU	2,732	2,764	2,536	1,125	56	1,170	3.4	3.4	3.3
Emergency									
Scheduled									
IP Cardiac	14,197	14,147	14,058	3,270	3,488	3,554	4.3	4.2	4.0
Emergency	9,128	10,111	10,041	1,968	2,314	2,354	4.6	4.4	4.3
Scheduled	5,068	4,036	4,017	1,302	1,174	1,200	3.9	3.4	3.3
IP Surgery	43,161	43,830	41,924	6,675	6,800	6,943	6.5	6.4	6.0
Emergency									
Scheduled									

Bed days 4%

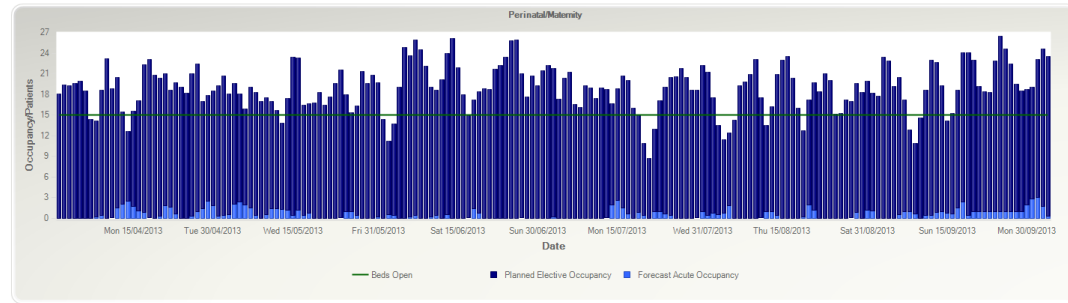
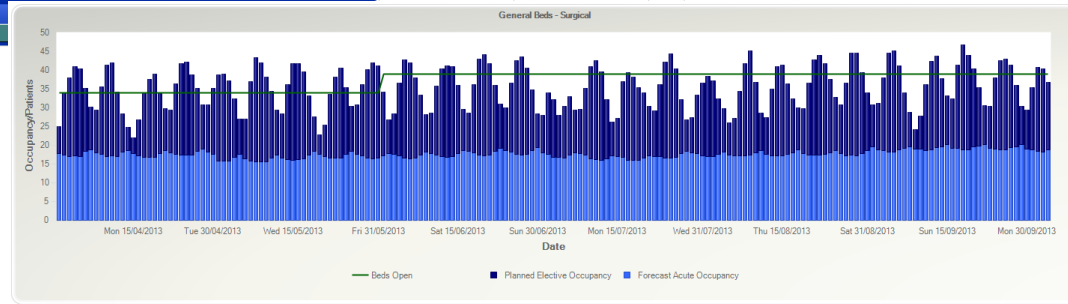
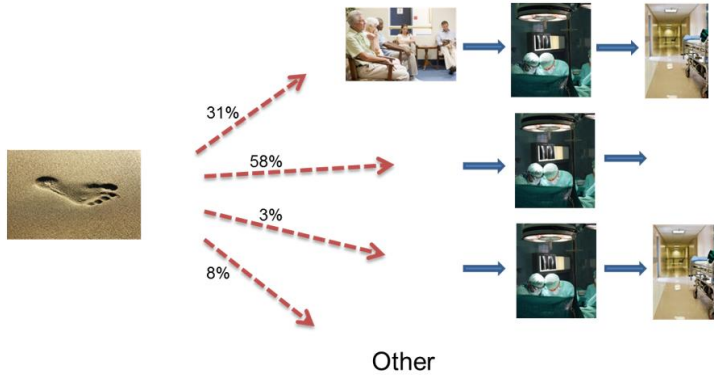
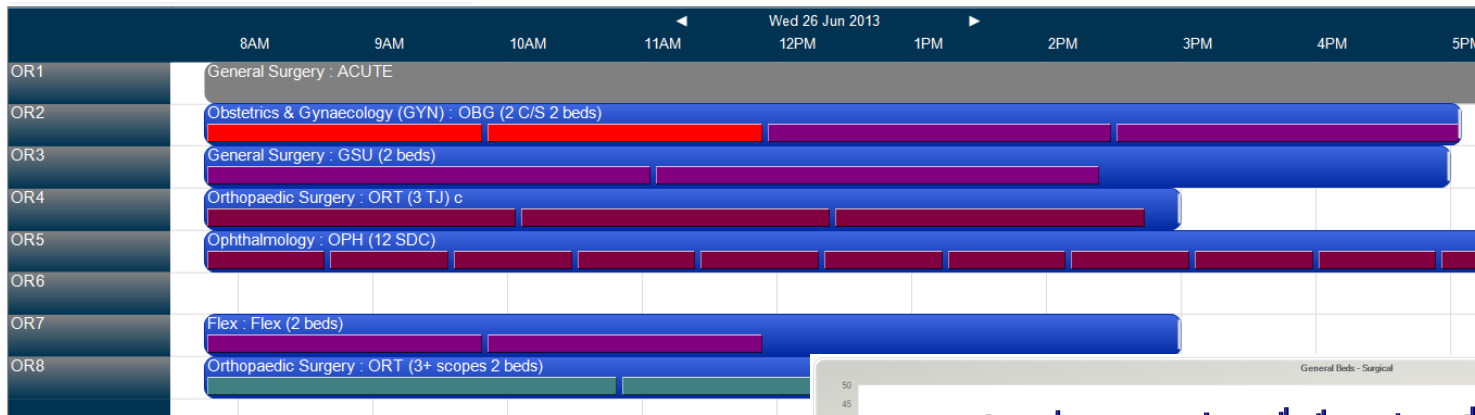
Activity 16%

ALOS 12%

- Analyze which services were driving these trends?
- What do we expect this year? Sustain or continue trends?
- What change initiatives are we investing in to increase volumes and reduce ALOS?

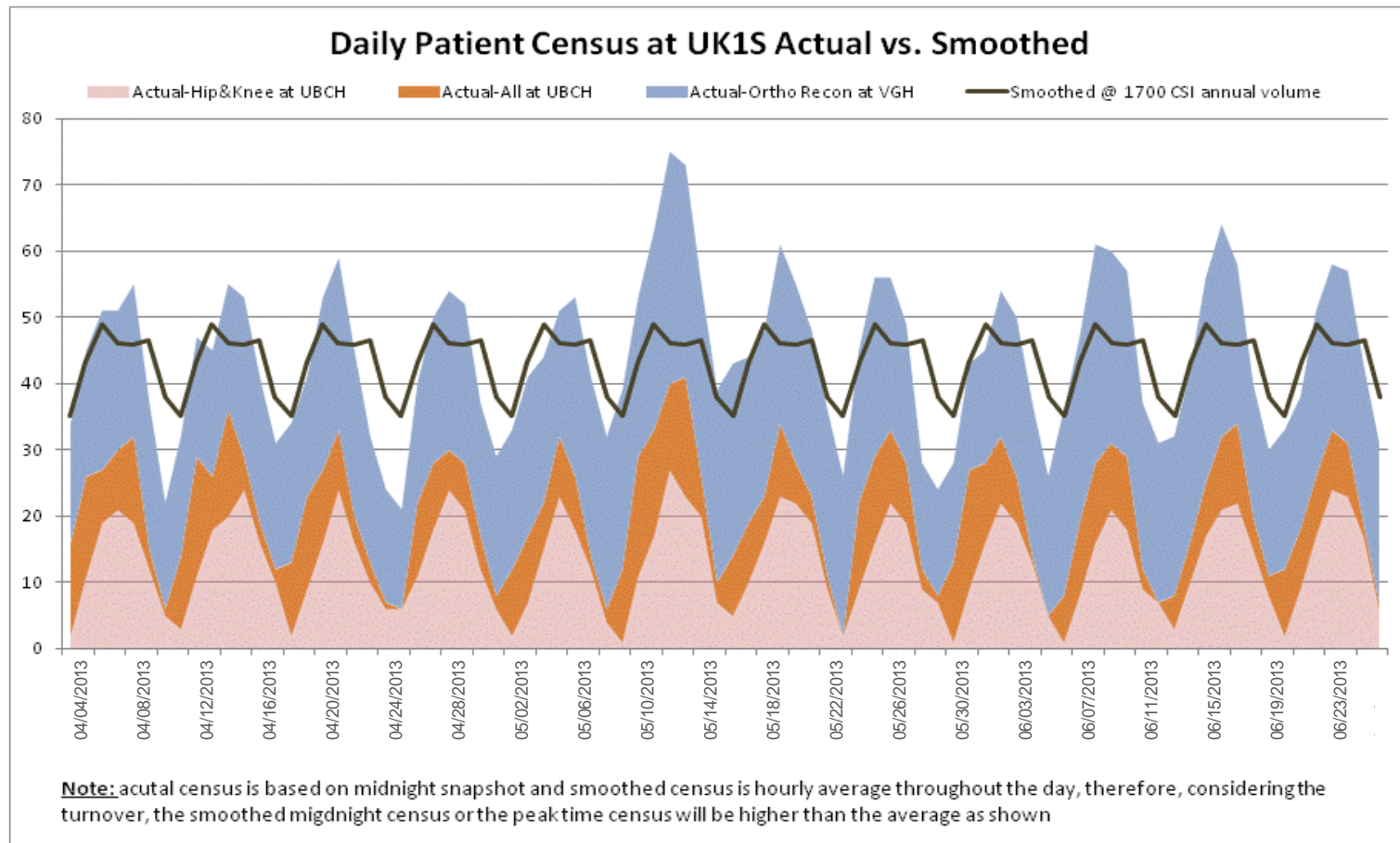
Simulation

Coded logic which emulates the actual individual patient ADT activity of planned patient admissions/bookings

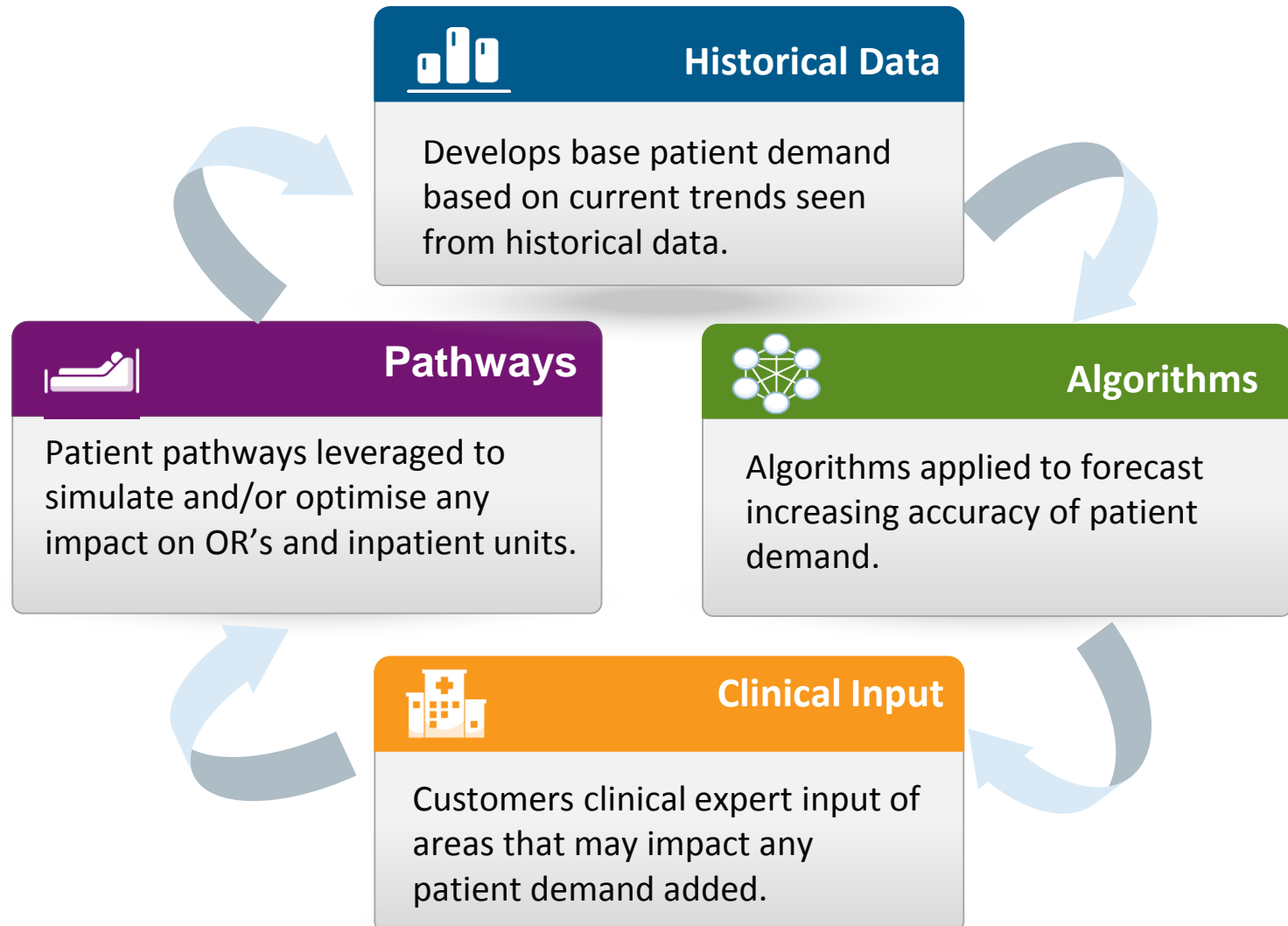


Optimisation

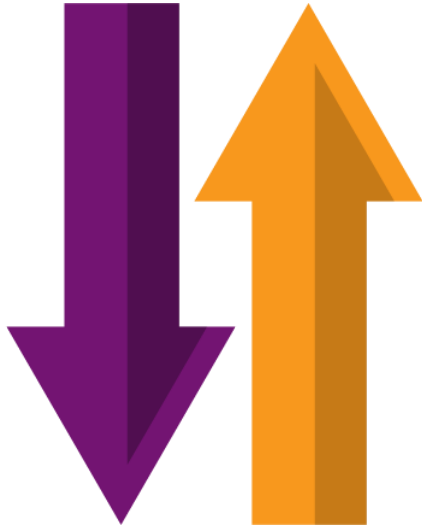
Using either a mathematical or algorithmic approach to derive the optimal outcome, based on an 'objective function'.



Combining Approaches



Comparing Planning Approaches



Aggregate vs. Patient-level

Static vs. Dynamic

Short term vs multi-horizon

Top down vs. Bottom up



**Learn from
yesterday.**

**Deal with
today.**

**Plan for
tomorrow.**

MCKESSON

Change the view.