



Better decisions. Better business.

BOARD BEAM: Overview

BOARD Enterprise Analytics Modelling (BEAM):
Drive better decision-making through more meaningful and predictive insights from your data.

BOARD BEAM seamlessly integrates advanced and predictive analytics with business intelligence and performance management, making it easier than ever for anyone to quickly gain powerful business insights and take action.

Conceived and developed in collaboration with IDSIA, a Swiss research institute recognised amongst the top 10 world-players in the Artificial Intelligence space, BOARD BEAM is a ground-breaking answer to two key unmet business needs. Firstly, the necessity to embed more advanced analytical and predictive capabilities into companies' business processes ensuring the agility necessary to operate at the ultra-rapid pace of today's businesses. Secondly, is the need to do this in a simpler way, allowing business users to take the lead without having to depend on an army of experts as necessary with the traditional data-mining and analytics products to manually build analytical data models.

BOARD BEAM is extremely flexible, easy to use for business users, high performing and natively embedded into the BOARD platform. BEAM offers a revolutionary solution to effectively incorporating all the power of predictive analytics into daily business operations and the decision-making process.

BOARD BEAM provides a solution that covers many analytical areas through three different modules: Predictive Analytics, Clustering and Analytical Functions.



PREDICTIVE ANALYTICS

BOARD BEAM offers advanced forecasting capabilities through the use of autoregressive linear models of the ARIMA family.

Thanks to its automated modelling approach, BOARD BEAM can automatically evaluate the characteristics of each time series, consequently producing a suitable model and run forecasts thousands of times faster than the main competitors do. The foresight achieved can be refined by adding further information to the scenario to reflect the impact of external variables (covariates) on the forecast.

Forecast results are immediately available as measures in the BOARD environment, making it easy to embed predictive analytics into analytical, planning and simulation applications.

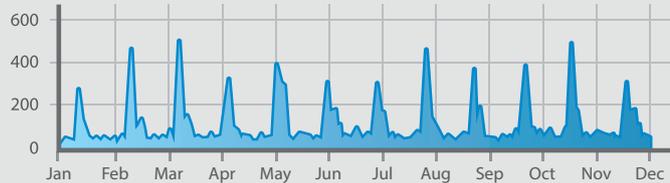


How it Works

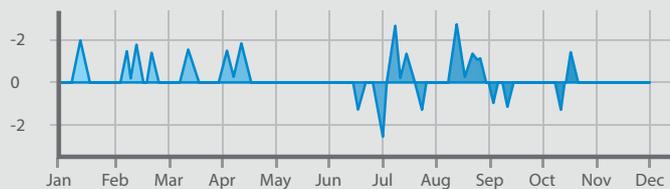
1. Analysis and labelling of time series

Once fed with historical data, BOARD BEAM first categorises time series as follows:

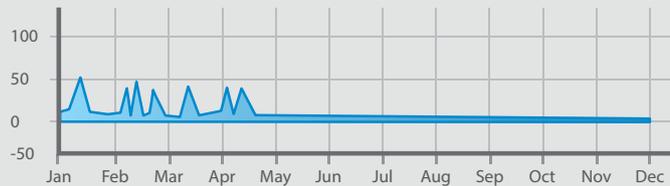
smooth: observations are consistently different from 0 (MDI Median inter-Demand Interval < 1.3)



intermittent: observations are characterised by extended periods of no demand (MDI > 1.3)



discontinued: the time series is constantly zero in the last year (all of last year values = 0)



If the time series is labelled as discontinued or if it contains no observations, the Zero predictor is used for forecast.

If the time series is labelled as intermittent, it is modelled via the Croston-SBA (Syntetos and Boylan Approximation) model, which is the state of the art calculation for predicting intermittent time series.

Time series labelled as smooth are entered into an automatic preparation and competition process between ARIMA family models, as described below.

2. Models Competition

Once a historical series has been labelled as smooth it goes through an automatic process aimed at properly modelling trend, seasonality and covariates, and to subsequently identify the best forecast model for each time series.

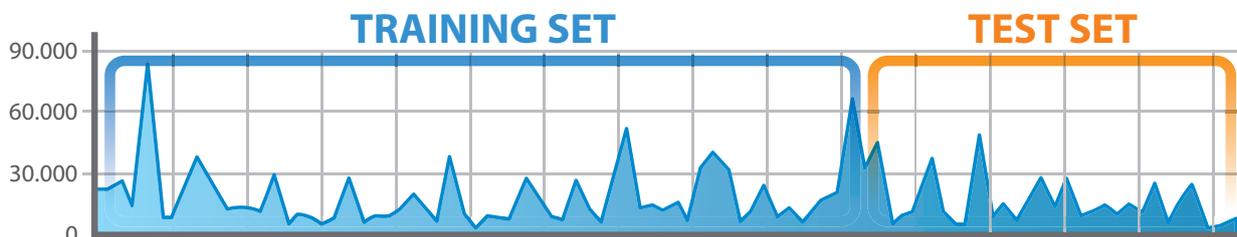
The process consists of the following steps:

Data series pre-processing

To improve the predictive accuracy of the model in this phase, the system normalizes data (data trimming) and, based on a recursive statistical test, automatically de-trends and de-seasonalises any time series that needs it.

Training and Test set identification.

In this phase any time series is split in two parts: a training set, on which candidate models are applied, and a test set, on which the accuracy of those models is measured.



Model selection: the IDSI-ARX® (autoregressive exogenous) algorithm

Once the time series is prepared, and the training and test set are defined, a predictive model can be identified.

At this stage, BEAM runs the IDSI-ARX®, a proprietary automatic prediction procedure conceived and designed by IDSIA, a Swiss University Research Institute ranked amongst the top ten Artificial Intelligence excellence centres in the world.

IDSI-ARX® is a linear autoregressive model. It assumes a linear relation between the future values of a variable and the past observations. The selection of the model structure is performed via a competition among the candidate models (Persistent and Seasonal Naïve Predictors and linear autoregressive models belonging to the ARIMA Family). The model structure that shows the lowest error in the competition, by minimizing the MASE (Mean Absolute Scaled Error) is eventually chosen.

Outliers detection and exclusion

BOARD BEAM automatically detects anomalous data in a time series where the prediction of the model has a large error. In particular, data points recognised as anomalous are those in which the error is greater than 3.5 times the standard deviation of the model from the mean. Once the outliers of a time series are detected, the model is retrained to ignore them.

3. Covariates management

Covariates are external variables such as promotions, marketing campaigns, weather conditions, etc. that are useful to forecast a certain time series: for example, usually the sales of a product can be better predicted if its price history is available as external information (covariate).

BOARD BEAM ensures an extremely flexible management of covariates. The system is able to receive a set of covariates for a given time series and to automatically identify the significant ones, whilst discarding the irrelevant ones. Once fed with all the data, BOARD BEAM automatically creates alternative predictive model structures characterised by different sets of variables (covariates), run a competition between them, and consequently select the set of covariates that minimize the forecast error (MASE).

4. Hierarchical Forecasting and reconciliation

BOARD BEAM allows business users to define a forecast hierarchy - to choose the different levels of aggregation they want to execute the forecasts. (i.e. product, product line, product category).

Once a hierarchy is defined, all the tasks previously described are automatically replicated on all its levels – producing different forecasts for each aggregation level.

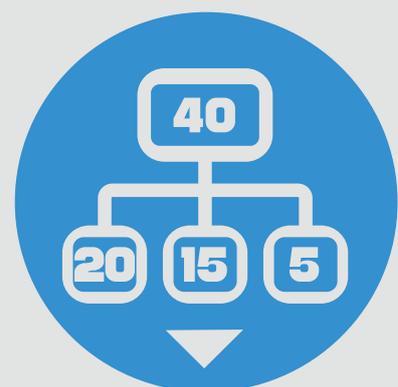
At this stage the users can decide not to reconcile the forecasts, or to run an automatic top-down or bottom-up reconciliation.



Not Reconciled



Bottom-Up



Top-Down

CLUSTERING

BOARD BEAM allows users to automatically define clusters of similar objects, by utilising the k-means methodology. Business users choose the number of groups and the observation sets (e.g. profitability and turnover) and instantaneously BOARD creates k-means clusters and makes them available as dimensions for analysis in the standard Business Intelligence and Performance Management environment.

The seamless integration between the clustering capability and the BOARD environment not only enables the immediate creation of reports, graphs, and self-service analyses based on clusters, but also the use of clusters as forecasting or planning units.

Furthermore, the capability to manage scenarios allows users to create several clustering options and to always use the best-fit based on the type of analysis or business process they are handling.



ANALYTICAL FUNCTIONS

BOARD BEAM offers a set of out of the box statistical functions, from the traditional min/max, average, standard deviation, to algorithms specifically designed for business analysis such as frequency, recency, dormancy and nascency. With this seamless integration into the BOARD platform, business users can instantly use these functions to build any analysis, dashboard or report.

> Business Indicators

- > Nascency
- > Recency
- > Frequency
- > Dormancy

> Across Time

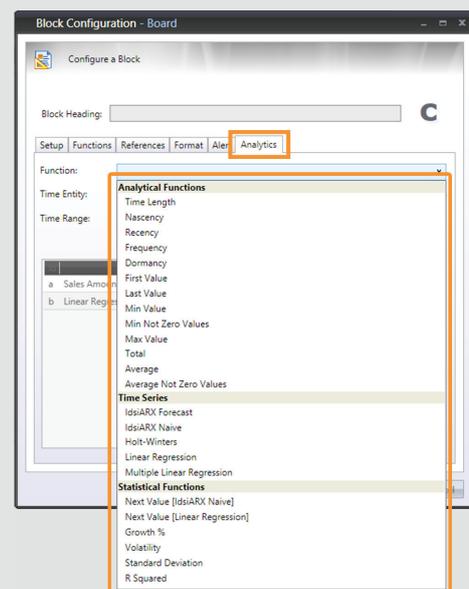
- > Time Length
- > First Value
- > Last Value
- > Min Value
- > Min Not Zero Value
- > Max Value
- > Total
- > Average
- > Average Not Zero Value

> Time Series

- > IdsiARX Forecast
- > IdsiARX Naive
- > Holt-Winter
- > Linear Regression
- > Multiple Linear Regression

> Statistical

- > Next Value [IdsiARX Naive]
- > Next Value [Linear Regression]
- > Growth %
- > Volatility
- > Standard Deviation
- > R-Squared



KEY DIFFERENTIATORS



Designed for Business Users

BOARD BEAM offers business users all the power of the most advanced statistical techniques without the need to physically develop, test and select the analytical models.

A standard business user with a basic knowledge of common statistical concepts will be able to produce state of the art forecasts, create clusters and use analytical functions with a few days of training.



Immediate use of analytical models in BI and Performance Management applications

BOARD BEAM is natively integrated into the BOARD platform, ensuring immediate interaction between the traditional BI and CPM functionalities and the new analytics environment.

This means that any cluster created is immediately available as an analysis dimension, any forecast as a measure and any advanced statistical function as a native algorithm.



Extremely efficient predictive analytical models (time vs accuracy)

The proprietary algorithm IDSI-ARX® - an exogenous, competitive, Autoregressive Integrated Moving Average (ARIMA) model, which is the core of BOARD BEAM, has been benchmarked against the world's top performing R-based forecast engines. The results show that BOARD BEAM is able to forecast with similar levels of accuracy, but hundreds of times faster than other systems.



Automated predictive modelling approach

Users only need to define the confidence interval and the forecasting hierarchy and then feed the system with covariates (factors that affect the forecast). Based on these inputs BOARD BEAM will automatically manage every single time series to produce the most accurate forecast through a competition between several candidate analytical models.



Extreme flexibility to define and change analytical models

The native integration between BEAM and BOARD, combined with the outstanding performances of the automatic modelling, makes it simple and extremely fast to feed the system with a high number of covariates and attributes and to immediately understand their impacts on the forecast accuracy.

Covariates do not need a specific format or pre-calculation to make them suitable to the BEAM analytical engine: any time series, Boolean values, algorithm, date etc. can be used to feed the model with more information to improve the overall accuracy of the model.

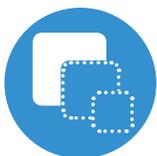
Furthermore, it is not necessary to build covariate time series with the same granularity of the observed time series because BOARD automatically calculates these at the aggregation level needed for the forecast.



High performance HBMP in-memory technology

BOARD's proprietary in-memory technology, HBMP, maps data at bit level ensuring one of the fastest data-retrieval speeds available on the market today.

Unlike R-based systems, this technology enables the analysis of thousands of time series in a few seconds, making it possible to quickly re-run scenarios varying the assumptions, and to quickly compare and evaluate the future impact of different business decisions.



Scalability to very large data sets/Big Data

The hybrid in-memory nature of BOARD HBMP technology allows for maximum scalability without sacrificing high performance.

When dealing with very large data sets it is possible to hold in-memory only data indices and mapping whilst leaving physical data on the disk: this way any "out of memory" problem is eliminated and the RAM is not overloaded with physical data, making it possible to achieve a far superior scalability without any significant performance slowdown.



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About BOARD

BOARD International is a global provider of Business Intelligence and Performance Management software.

Founded in 1994, BOARD has enabled over 3,000 companies worldwide to improve the effectiveness of their management decision making processes, unifying BI and CPM in a single integrated environment.

BOARD provides a seamless solution for the support, control and management of core processes such as:

- Reporting and Business Analytics
- Budgeting, Planning & Forecasting
- Profitability Modelling and Optimisation
- Simulation and What-if Analysis
- Scorecarding and Strategy Management
- Financial Consolidation

Thanks to its programming-free toolkit approach global enterprises like Acer, DHL, GSK, Mitsubishi, NEC, Puma rapidly deployed BI and CPM applications in a fraction of the time and cost associated with traditional solutions.

Headquartered in Switzerland, BOARD International has branches in US, UK, Germany, Italy, Spain, Benelux, UAE, Singapore, Australia, India, Japan, Mexico, Argentina and a worldwide network of distributors and certified partners.

www.board.com

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