

The Importance of Artificial Intelligence in Corporate Budgeting, Planning and Forecasting

Increasing forecast accuracy, reducing errors, and continuing to simplify the process of plan creation have high priority for the Office of the CFO.



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Table of Contents

Executive Summary	3
AI's Immediate Value in Budgeting and Forecasting	4
Budget Accuracy and Predictive Analytics.....	4
Quality Assurance for Budget Data.....	4
Budget Data Errors	5
Anomaly Detection.....	5
AI Eliminates Bias	6
Natural Language Query (NLQ)	6
AI's Next Step in Budgets: Increased Accuracy	6
AI Picks the Best Forecasting Methods.....	7
Machine Learning.....	7
Robotic Process Automation	8
AI's Longer-Term Role in Budgeting	8
Helping to Select Budget Drivers.....	8
Human Limits in Selecting	9
Summary: The Benefits of AI in Budgeting	10
About BPM Partners	10
About Unit4	10

Executive Summary

Vendors of corporate performance management (CPM) software have begun to recognize the importance of artificial intelligence (AI) capabilities in their products. Nearly all vendors have some AI-based features today, or under development for an upcoming release, but only a select handful have emphasized AI as a strategic, fundamental component.

Customers have started to request AI in CPM systems, particularly for its value in predictive analytics and forecasting – which many in Finance already have experience using that predates the use of AI in this area. The BPM Partners Pulse Survey for 2018 finds predictive analytics in the top ten features considered most important by CPM users.

This white paper focuses on the role of AI in budgeting but some of the discussion is applicable to other areas of CPM and Finance as well. Due to its “high volume, accurate historical records, and quantitative nature”, Finance is well-suited for artificial intelligence, as Daniel Faggella writes in *Machine Learning in Finance – Present and Future Applications*¹.

Organizations can use help in seeing ahead with greater accuracy. One study found that only 1% of companies can forecast with 90% accuracy 30 days out². Corporate budgets are notoriously “wrong the moment they are published.” AI is one of the tools which can increase accuracy of enterprise budgets and forecasts.

AI can help improve the accuracy of predictions, through a variety of means, such as selecting the best statistical methods for predictive analytics.

AI has another immediate role to play in CPM and budgeting: quality assurance of data inputs. AI – much more than humans with their inherent biases and poor attention span – can pick out budget numbers that are questionable or out of sync with historical and forecast expectations. This quality check also helps when bringing in actual results for performance reporting.

Over the longer term, AI can take on a more strategic role, continually fine-tuning and optimizing the structure and logic that make up the budget itself. For example, AI can

¹ June 29, 2018 <https://www.techemergence.com/machine-learning-in-finance/>

² Ashish Prakett, April 5, 2018 <http://ww2.cfo.com/forecasting/2018/04/four-ways-forecasting-goes-wrong/>

determine that changing the budget drivers or weighting them differently would be likely to yield a more accurate budget.

AI's Immediate Value in Budgeting and Forecasting

Budget Accuracy and Predictive Analytics

Since budgets struggle to achieve accuracy, and real results constantly diverge from budgets, companies need to reforecast periodically throughout the life of the budget. While the underlying budget does not change of course, companies need to manage to current realities.

AI improves the accuracy of forecasts, by utilizing machine learning to select the best predictive method or forecasting technique, based on its analysis of the historical data.

Users can then tweak the forecast based on their assessment of where the business is headed. Those reluctant to give up that much control of forecast creation can still benefit from predictive analytics. They can generate their own forecast and then have the system assess the probability of their forecast coming to pass.

Quality Assurance for Budget Data

Humans can evaluate and consider budget numbers, but they have limits in evaluating every budget input: every human contributor is likely to be comfortable and knowledgeable in certain areas, but not all. Their “feel for the numbers” can go only to a certain level of detail. AI, however, enables a system to look at every budget input and rate it versus other time periods, and catch divergence from its usual relationship to other numbers.

Terminology: AI, NLQ, and More

To assist readers, below are high-level definitions of key terms.

Artificial Intelligence (AI). Intelligence demonstrated by machines or systems., especially when a machine mimics cognitive functions such as learning and problem solving.

Predictive Analytics. A variety of statistical techniques, used in business to exploit patterns found in historical and transactional data.

Natural Language Query (NLQ). In the context of CPM, NLQ allows a person to interface with a system, using typical spoken or written statements to query the system.

Machine Learning. A field within AI that uses statistical techniques to enable a system to progressively improve on performance on a task, “learning from data” without being explicitly programmed to do this.

Budget Data Errors

A large enterprise's budget is likely to contain erroneous entries; some may be glaring, others more subtle. Catching discrepancies early, before they are hidden in a consolidation or rollup, is important. Errors come from several sources:

- incorrect performance data for past periods
- forecasts based on inconsistent assumptions or poorly selected drivers
- typos and spreadsheet goofs
- application of the wrong statistical methods
- inability to spot trends in available numbers
- excessive optimism or pessimism

Even experienced veterans of a budget process can overlook errors, and due to fatigue or time pressure, they might miss extraordinary numbers that should be questioned.

AI is thorough. AI can apply a consistent analysis to everything in the budget; humans find that nearly impossible, because they focus on the numbers where they feel most comfortable and knowledgeable.

Anomaly Detection

Anomaly detection is another application of AI in budgeting that is already in use to a limited degree. While less visible than predictive analytics and NLQ/NLP, anomaly detection could prove more valuable, by helping to squeeze inaccuracy out of budget inputs. This function spots data that is outside the expected normal range.

AI is relatively new in budgeting, and not yet widely trusted – despite the fact that it is the foundation of most predictive analytics capabilities today. Anomaly detection is one application of AI to budgeting that appears to be a natural winner with virtually no added risk. Few would worry that applying AI to catch anomalies increases risk in any way.

As a robotic process, AI uses automated analytics to find the root cause of a deviation / anomaly.

Real-Time Anomaly Detection

AI enables a CPM system to give automatic feedback while budget numbers are being entered, noting a conflict or aberrant figure that is out of place. This capability can be obtained in systems today.

AI Eliminates Bias

Humans bring their conscious and unconscious preferences into budgeting and forecasting. Impartiality is an ideal, but not a reality, in corporate budget-making.

AI can be a counterweight against unavoidable natural bias; for example, it has no allegiance to “the boss” and would give no extra weight to the opinions or demands of a dominant executive.

Natural Language Query (NLQ) of CPM Information

NLQ, like anomaly detection, is earlier-stage than predictive analytics in terms of market demand/acceptance and being available in performance management systems today.

Think of Siri, but customized for the Office of the CFO, giving users the ability to type or speak a well-worded query such as, “Show me sales figures only for the entire USA for Q2, covering all product categories, and extrapolate to Q3 forecast,” and obtain a quicker response. In other words, AI does the work of specifying report parameters to the CPM system.

The current alternative, of course, is to select options from multiple pull-down menu, or in some systems, create a scripted query to retrieve budget or report values. NLQ has, in our view, much value to contribute by making performance (and budget) data readily available to a larger audience of employees.

Verification of the results of the NLQ query is essential. As a practical matter, an NLQ-enhanced CPM system should include the parameters of the query in the reply: “In Q2 this year, the total online sales for all product categories in the US totaled 7 point 5 million dollars.”

AI’s Next Step in Budgets: Increased Accuracy

When humans follow all best practices, and set the budget rules accurately, the budget tends to be accurate. However, if a \$1 billion budget is off by 5%, that’s a \$50 million target miss, which might exceed the net income of the enterprise. The point: once we are routinely able to achieve higher accuracy, today’s norms may be perceived as too unreliable – or possibly, as a sign of incompetence.

AI Picks the Best Forecasting Methods

AI can help squeeze inaccuracy out of the budget by means of anomaly detection, and by correctly selecting the right forecasting methods.

Why can't [most] humans choose the right statistical method to make more accurate predictions?

1. Most people in Finance – including most with MBAs in Finance - have very limited experience applying forecast methodologies. It is not an intuitive process.
2. AI is faster, and can be more accurate than the great majority of people – including those with deep experience in finance - in looking at past data and choosing the best statistical method to apply in making forecasts. Example: Seasonality may be obvious in data, but which seasonality adjusting method is best and will yield the highest accuracy?
3. When the situation changes – i.e. becomes more seasonal, or less so, people do not usually adapt well by recognizing quickly that it's time to discard the existing set of forecast methods, and picking the correct NEW set of methods.
4. Humans may apply the right forecasting method – take seasonality as an example – to the wrong data. For example, should a retailer apply seasonality to sales numbers, or to underlying drivers such as the number of website and mobile app visitors?

Machine Learning: AI Can Continually Autotune a CPM Budgeting System

AI, when complemented by a capability known as machine learning, gives greater accuracy to data, budget rules, and budget drivers. AI is impervious to fatigue or boredom in working with large sets of data.

Machine learning is an AI feature that allows continual autotuning and adjustment of the system as the environment for the budget changes. More specifically, machine learning can contribute by continually refining the budget logic and rules. Humans are not outstanding at this task, but AI can be. It's reasonable to expect that machine learning will have a larger impact on CPM systems over time, in both selecting and weighting budget drivers. From the user point of view, it's an under-the-hood feature and most will simply see machine learning as another capability of their CPM system.

“The convergence of technologies like machine learning and predictive analytics looks set to define the next phase of finance transformation,” according to Matthias Turner, writing in DOFonline.com.³

Robotic Process Automation

Robotic process automation (RPA) is lower on the priority list, as a capability to add, for most performance management vendors. Yet it would seem to be a big win in terms of making a system more intuitive, easier to use, and therefore ready to be rolled out to larger groups of users. RPA automates the steps of a repetitive multi-step process.

For example, if every month you need to load data, consolidate, run some reports, and notify a list of people that the reports are ready, RPA can do this for you. It saves time but it also prevents you from inadvertently missing a step, such as forgetting to re-consolidate after loading the data (and therefore producing reports with old data).

More simply, RPA can help you navigate through the system. An infrequent user of the CPM application who only enters a budget once a year might forget the required steps by the following year. With RPA functionality, the CPM system can prompt the user to complete appropriate steps based on their prior usage pattern. So, after finishing your budget it can suggest that the user lock and submit their data, print a copy for their records, and notify their manager that it’s waiting for approval.

Some CPM systems already have a similar capability today, but with AI it will become more accurate, more adaptable to your particular needs, and more widely available throughout the system.

AI’s Longer-Term Role in Budgeting

Helping to Select Budget Drivers for a More Accurate Model of Reality

Budget drivers can be seen as the logical levers that interpret the company strategy, how the company fundamentally operates, and market conditions for the purposes of budgeting.

³ December 19, 2017 <http://dofonline.co.uk/2017/12/19/robots-will-change-finance-sector-ever/>

AI has the ability to continually adjust and fine-tune – or recommend updates – to the budget drivers. It may take some time before finance groups trust the results of AI enough to entrust the task of updating drivers and the weights assigned to them, to a CPM system.

An AI-based CPM solution can consider, weigh, and prioritize any number of drivers – equally important, it can continually analyze whether they continue to perform as accurate predictors, and replace them when they become less accurate.

Furthermore, AI can continually test out new influencing factors that are not formally approved as budget drivers.

Human Limits in Selecting and Weighting Drivers

People can size up, and grasp interactions, among as many as six or seven drivers and intuitively track them fairly well. AI does not have a practical limitation in spotting dependencies and picking out the “true” drivers.

Summary: The Benefits of AI in Budgeting

The CPM marketplace today sees and values the role of predictive analytics, but is not yet fully educated about the contributions of AI and machine learning to forecasting, let alone future uses of AI in enterprise budgeting.

AI can improve the forecast accuracy, speed, and data quality of corporate budgeting. AI-driven CPM will help the Office of CFO become more responsive and effective with budgets and forecasting.

AI has great potential to help in the process of adapting budgets continually to changing circumstances over time, keeping them “tuned” and in sync with reality, thus improving their accuracy.

Long-term, we expect AI to become an integral component of budgeting and forecasting – continually refining and updating these processes.

As AI continues to advance it will be able to take more of a leading role in the budgeting process, but as with self-driving automobiles we expect it to primarily provide guidance and recommendations to the experts in Finance who will remain firmly in the driver’s seat for the foreseeable future.

About BPM Partners

BPM Partners is the leading independent authority on business performance management (BPM) and related business intelligence solutions. The company helps organizations address their budgeting, planning, financial reporting, regulatory compliance, profitability optimization, key performance indicator (KPI) development, and operational performance challenges with vendor-neutral experts who can guide companies through their BPM initiatives from start to finish while both reducing risk and minimizing costs. For further details, go to www.BPMPartners.com. Follow BPM Partners on Twitter [@BPMTeam](https://twitter.com/BPMTeam).

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