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Predictive Planning – improve business planning with forecasting and predictions

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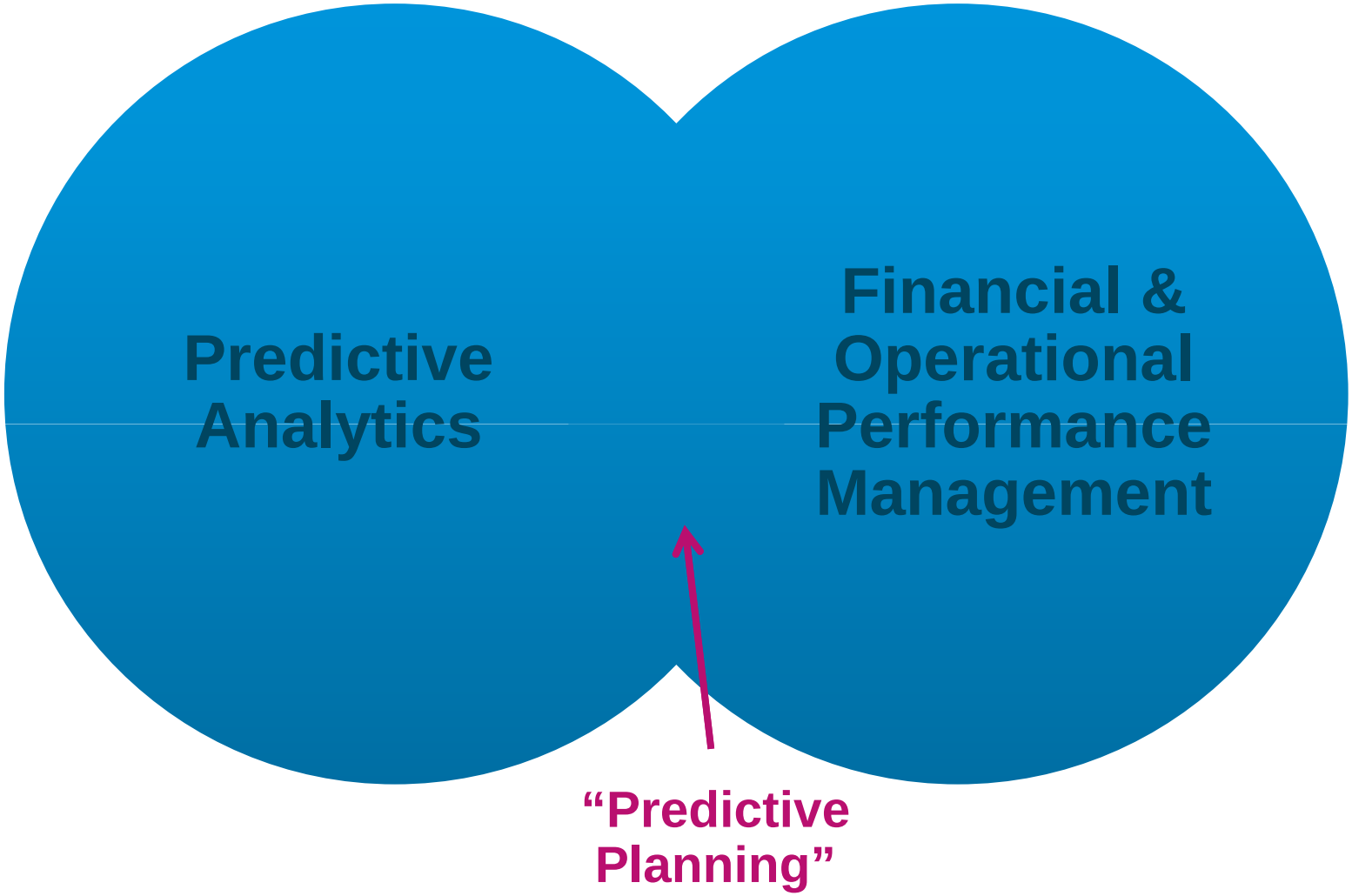

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"How should you respond when you get powerful new tools for finding answers?

Think of harder questions."

Clive Thompson – Smarter Than You Think:
How Technology is Changing Our Minds for the Better
(William Collins – September 2013)

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Harder questions…

If I could accurately predict…	Then I could…
Sales for every SKU in every store	Reduce supply chain expenses and increase sales
End-of-month revenue attainment based on performance to date	Apply resources and attention where it is most needed
Day Sales Outstanding for every individual invoice	Better manage my working capital
The likelihood of cancellation for every individual customer	Set the marketing budget appropriately
The impact of these proposed changes on the company's KPIs	Pick the best option and avoid surprises

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What would you change if you could…

Predict more **accurately**

Predict more **granularly**

Assess impact of proposed changes before implementation

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Customers are doing this now

AUSTRALIA POST	• Monthly and daily cashflow predictions, integrated with actuals • Near-real-time visibility into all business operations – Instant insight into the ramifications of decisions without waiting • What-if analysis for stronger business cases and justifications
ELIE TAHARI	• Ability to predict customer orders four months in advance with better than 97% annual accuracy • 30% reduction in supply chain and logistics costs. • Reduction in the proportion of shipments sent by air freight from 80% to less than 50% • Increased sales and stronger margins
PABST BREWING CO · SINCE 1844 ·	• Accurately forecast business demand • Reduces costs associated with under-stocked and over-stocked products • Increase sales revenue by enabling it to accommodate the seasonally evolving needs of its customers.

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"We've built a very accurate model for *mid-month and month-end cash forecasting* that uses regression analysis to show us what our cash requirements are likely to be over the coming weeks and months.

When our forecasts relied more on the opinions of financial experts, we used to have to keep a 'cushion' of a few million dollars in case their estimates were wrong. **Now we have much more confidence in the forecasts, so the cushion can be much smaller**."

Patrick Neeley, Chief Financial Officer,
Chickasaw Nation Division of Commerce

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So how do they do this?

Integrate predictive analytics in the planning process	• Analytics deliver a “starter for 10” planning • Based on proven patterns found in the data • Domain experts adjust as needed
Use sophisticated forecasting algorithms	• ARIMA, Exponential Smoothing • Automatically pick the best model • Monte Carlo simulation
Add external predictors	• Economic indicators • Own and competitor activities • Weather • Etcetera

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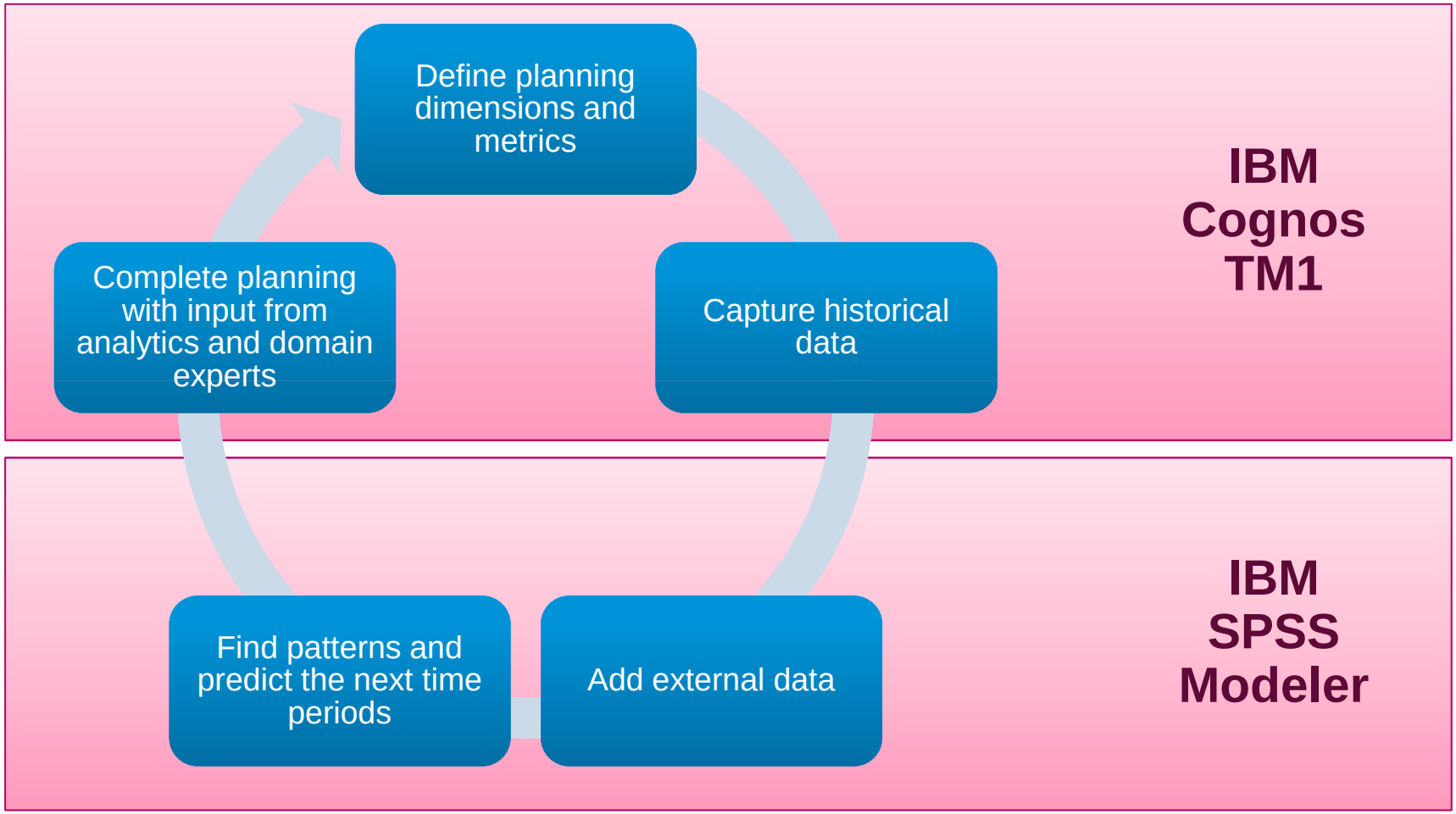
How IBM technology supports this



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PREDICTIVE PLANNING IN ACTION

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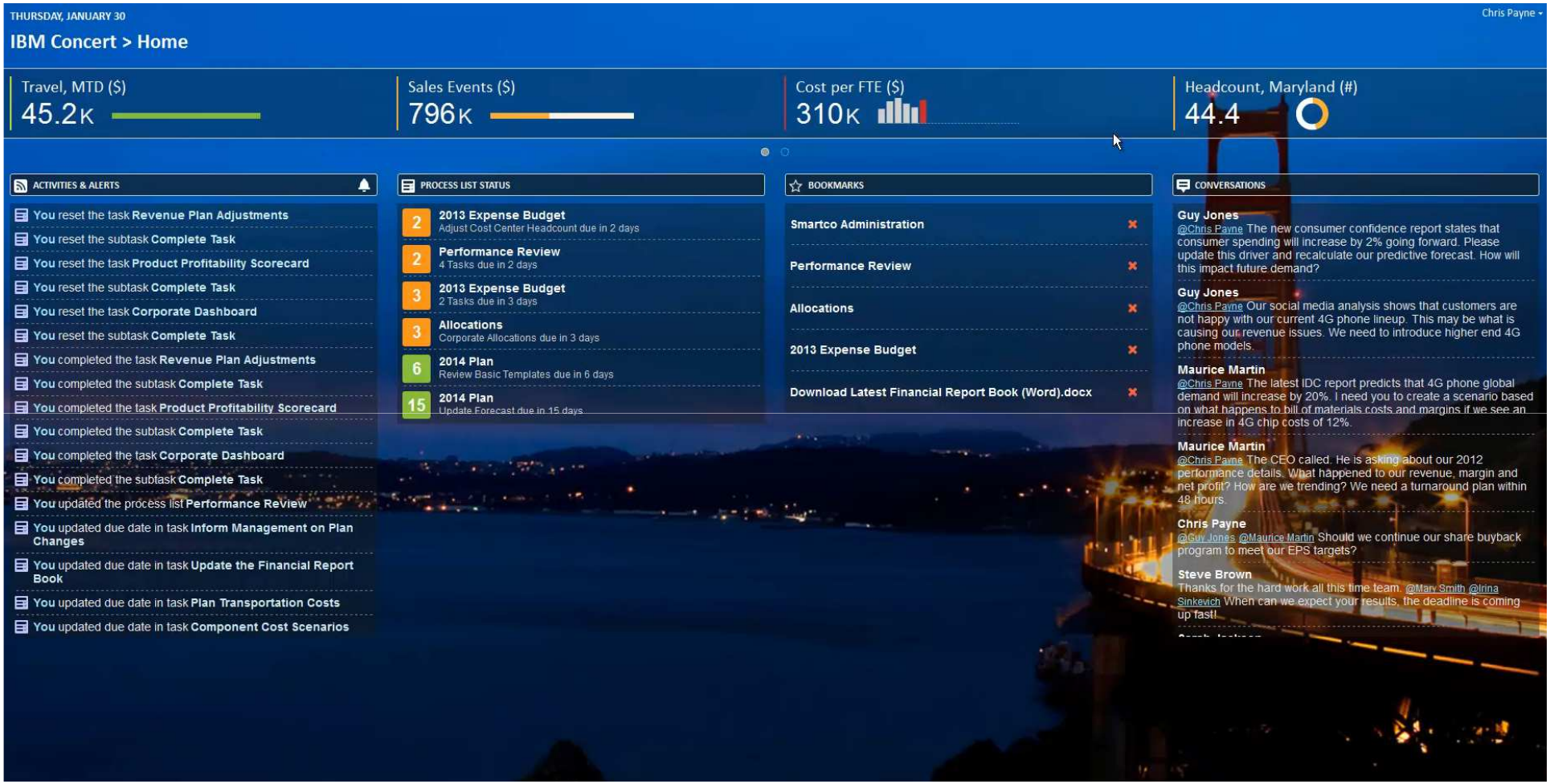

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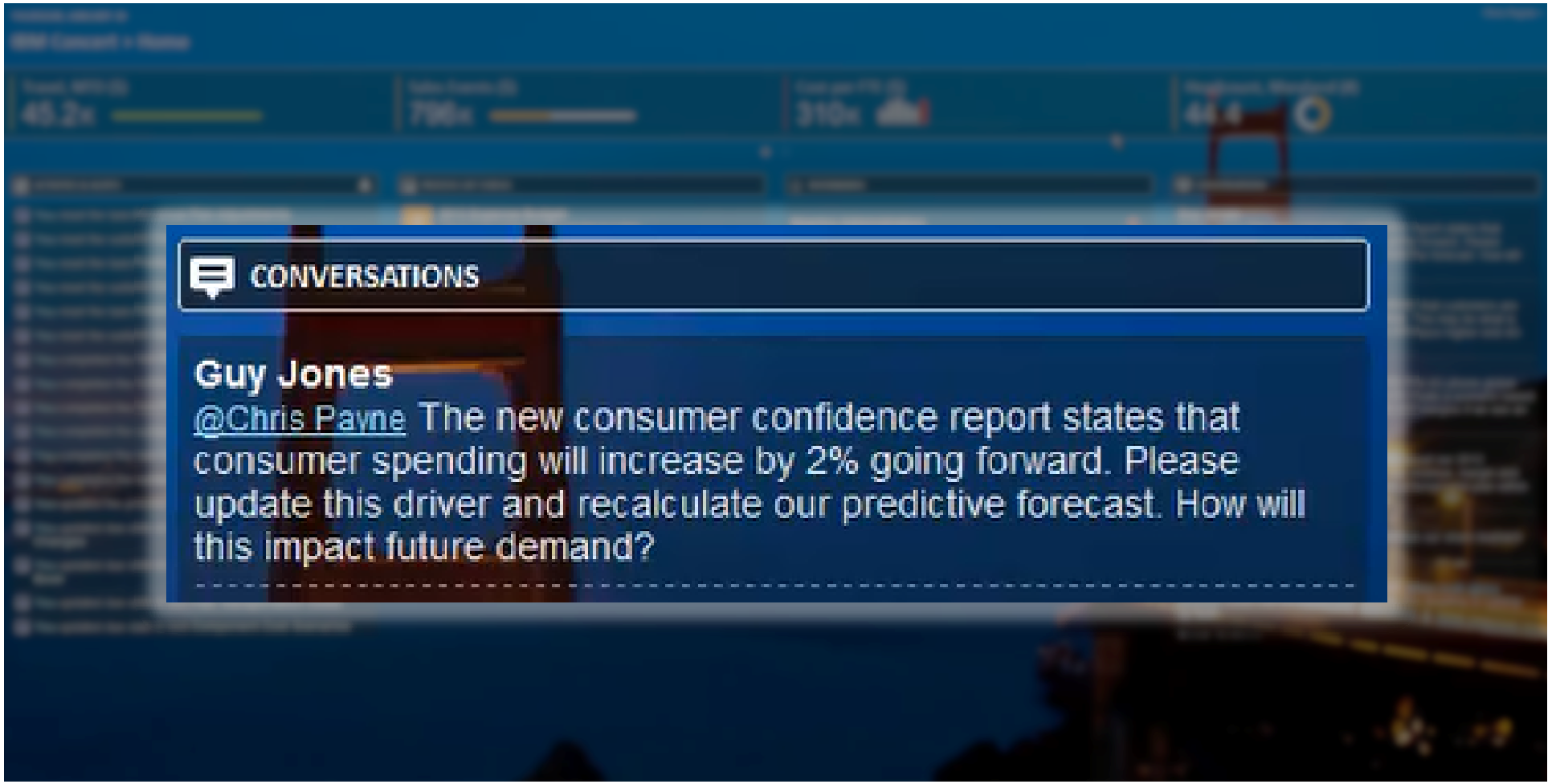

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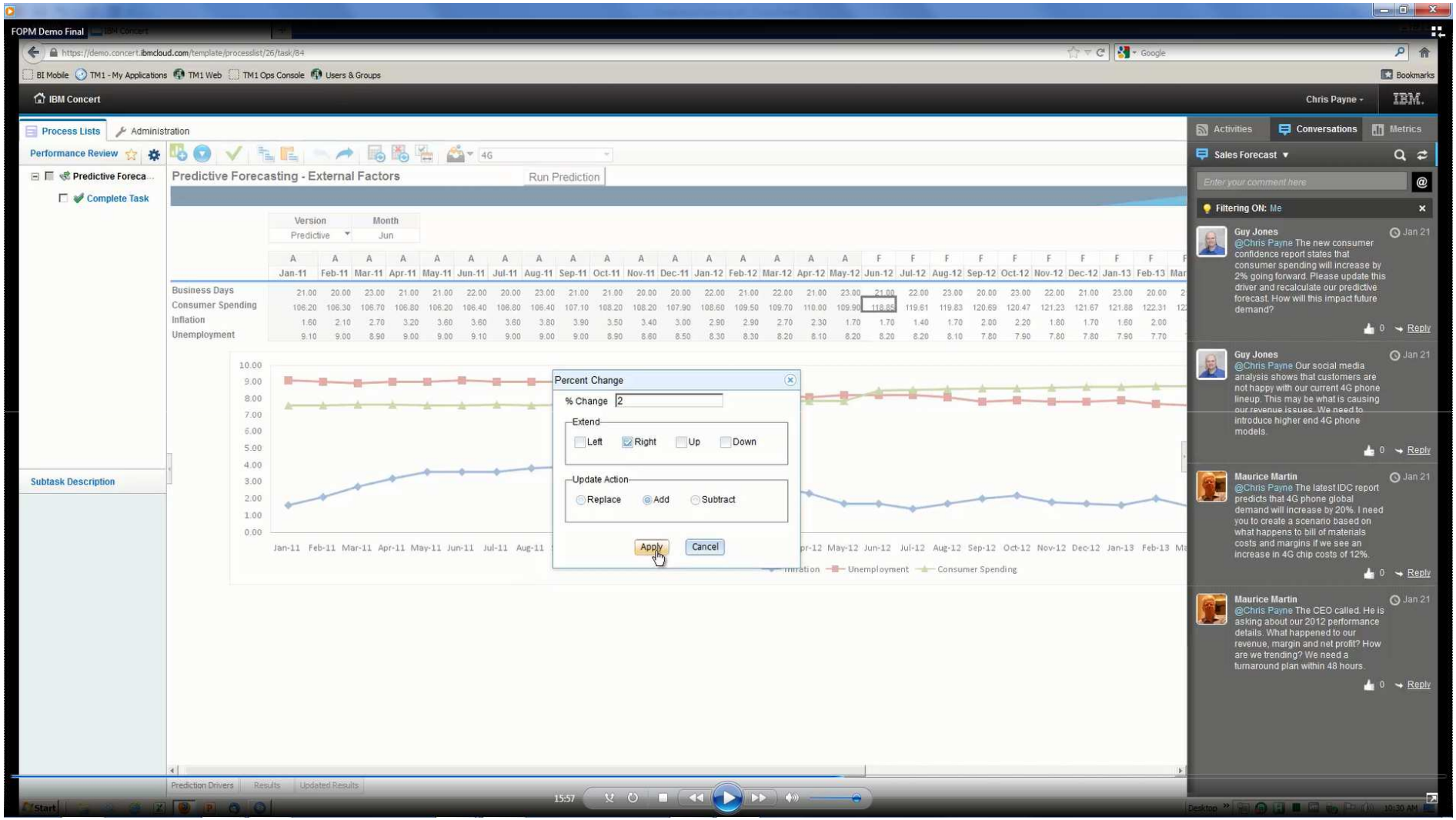

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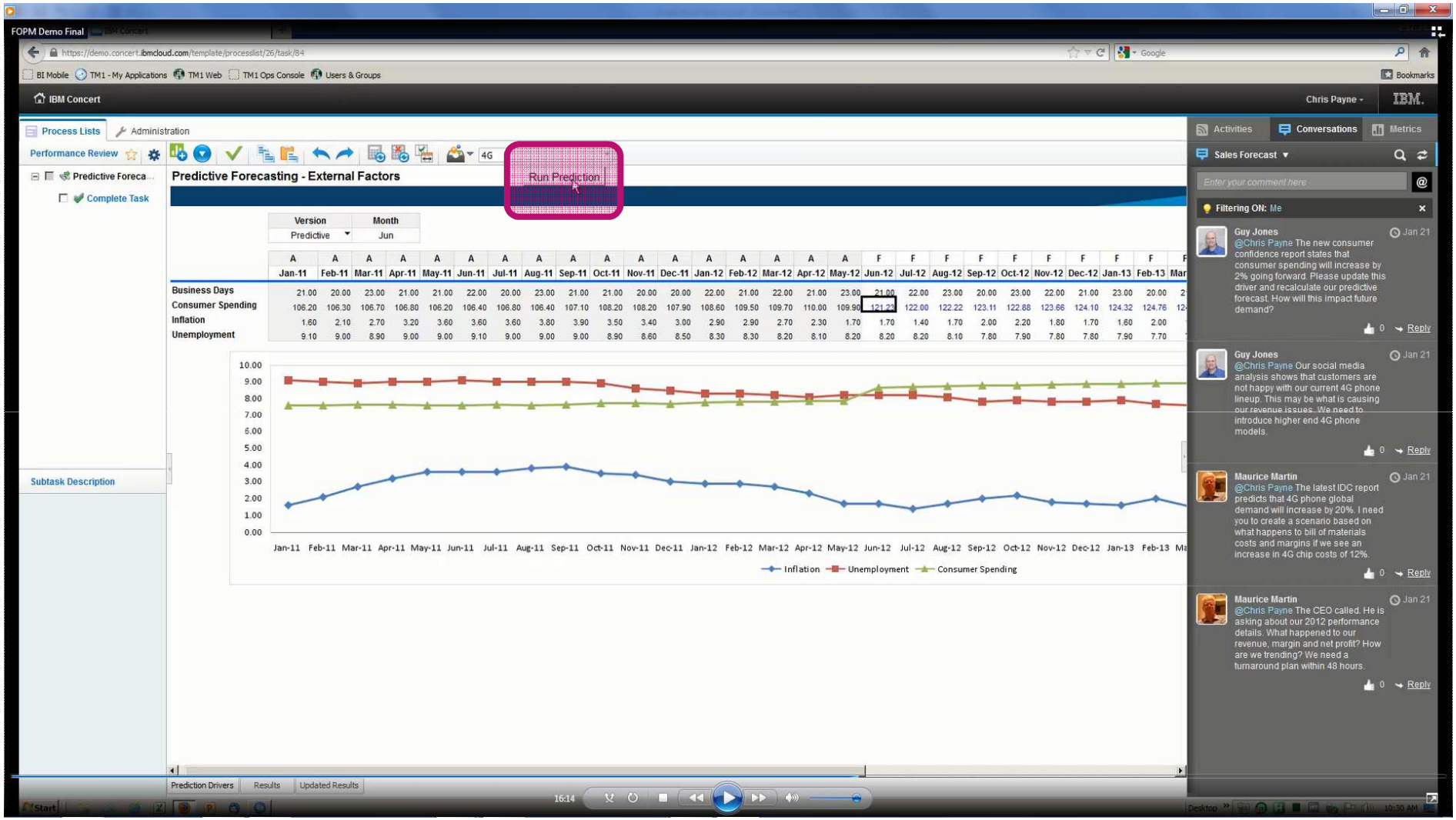

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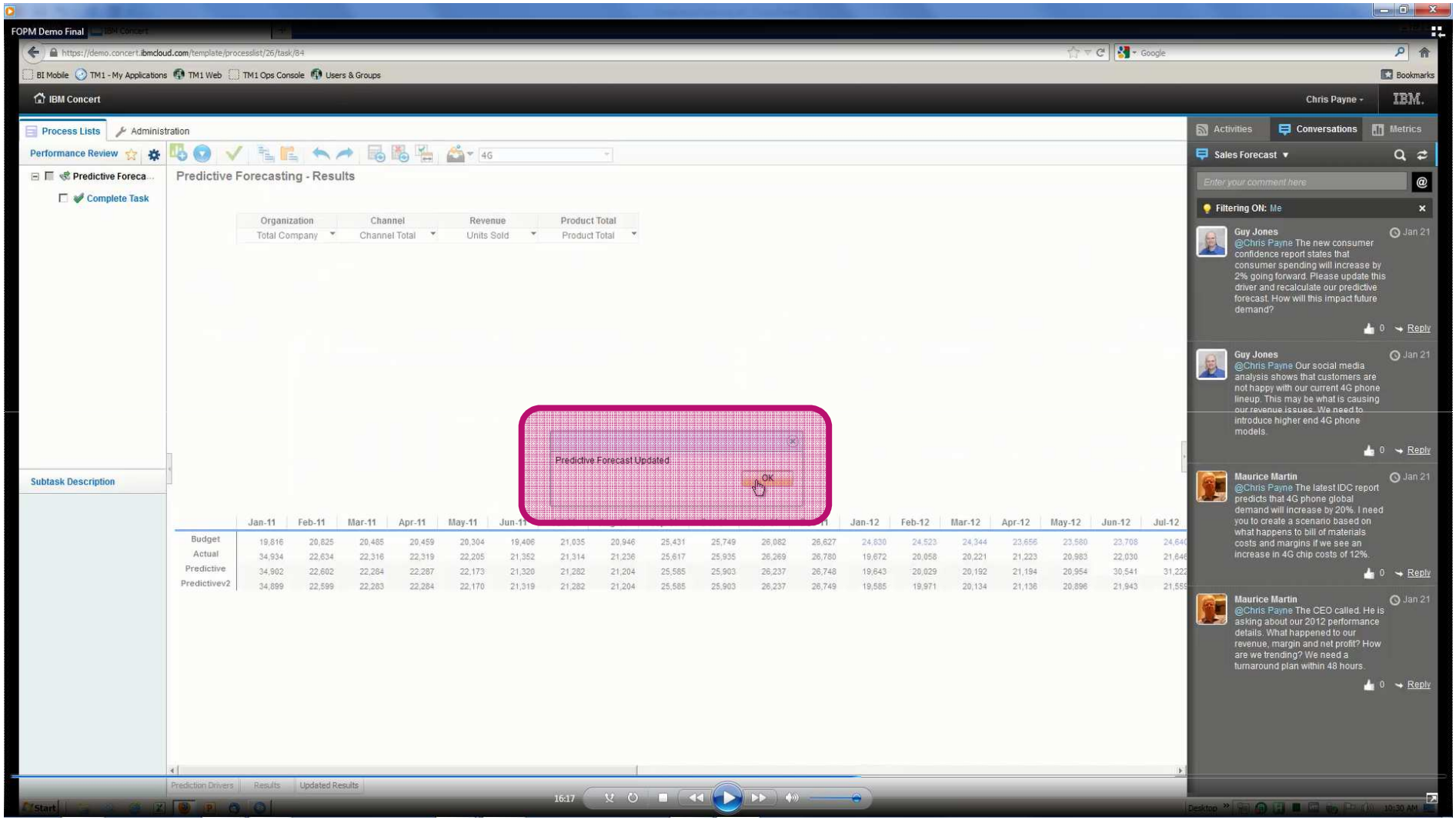

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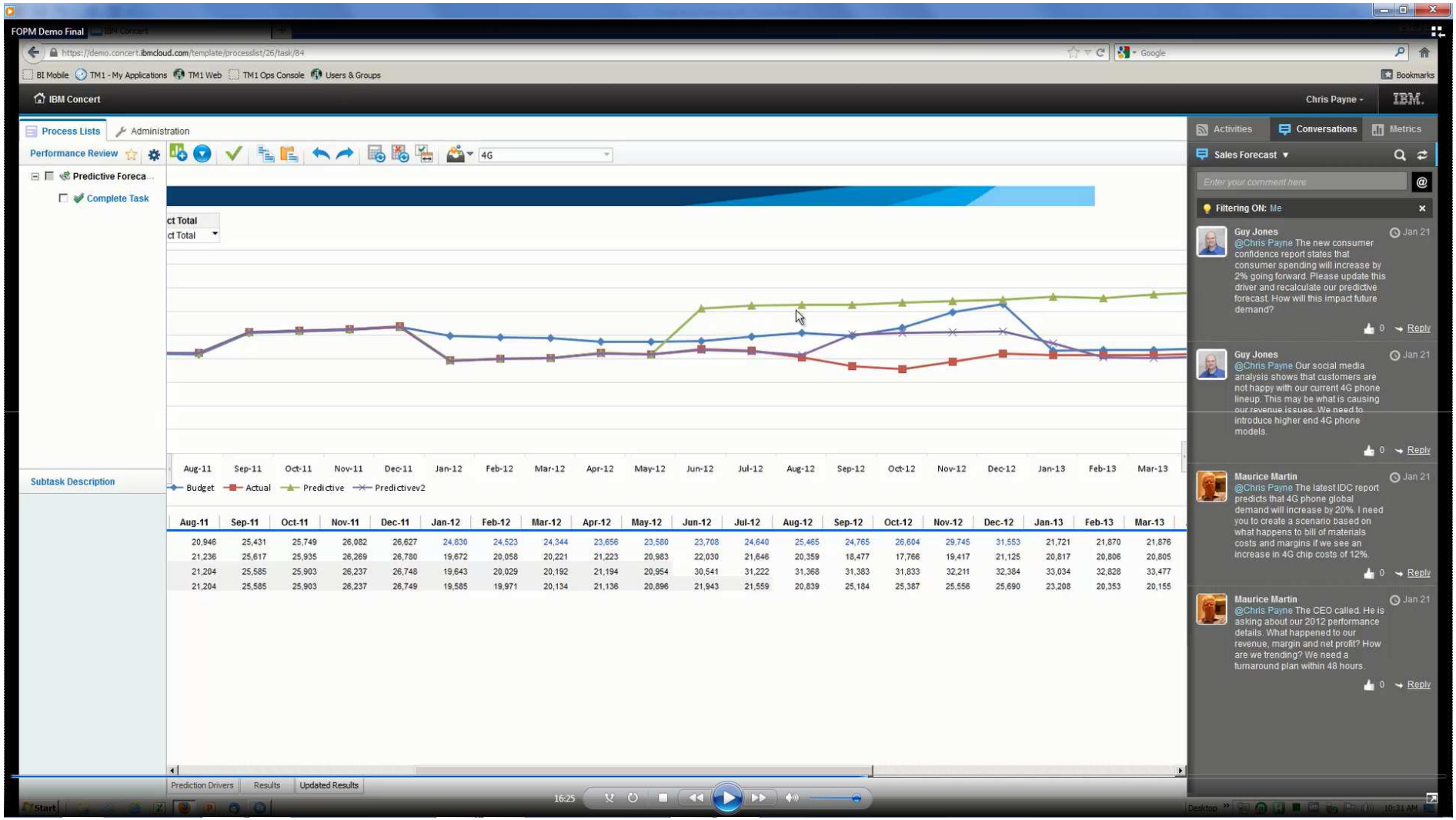

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How it works behind the scenes

- We will go over a 5 step process to accurate forecasts:
  - Step 1: We will import data into SPSS Modeler from TM1 in order to develop a more accurate forecast
  - Step 2: We will examine the traditional trend lines
  - Step 3: We will develop the high quality forecast using SPSS Modeler invoking expert forecasting algorithms and adding external predictors
  - Step 4: We will review the accuracy of the forecasts in SPSS Modeler
  - Step 5: We will push these results back to TM1

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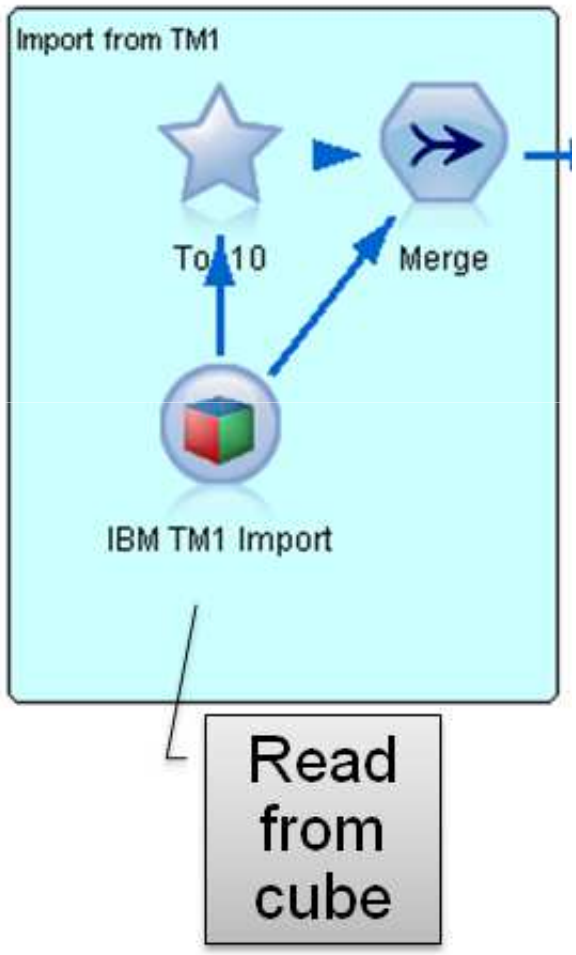
Step 1: We will push data from TM1 into SPSS Modeler in order to develop a more accurate forecast



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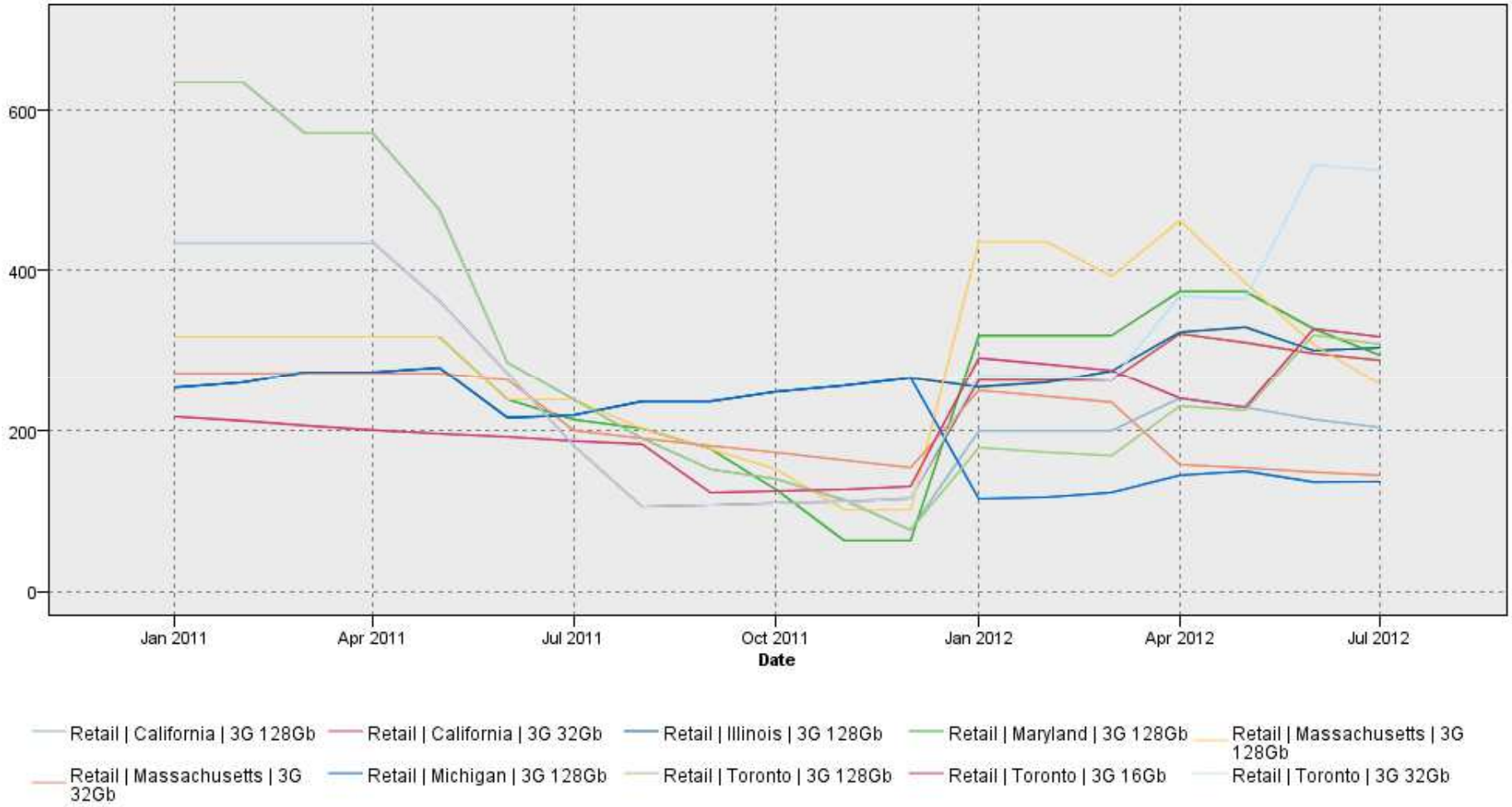
Step 2: We will first examine the accuracy of the forecast in TM1



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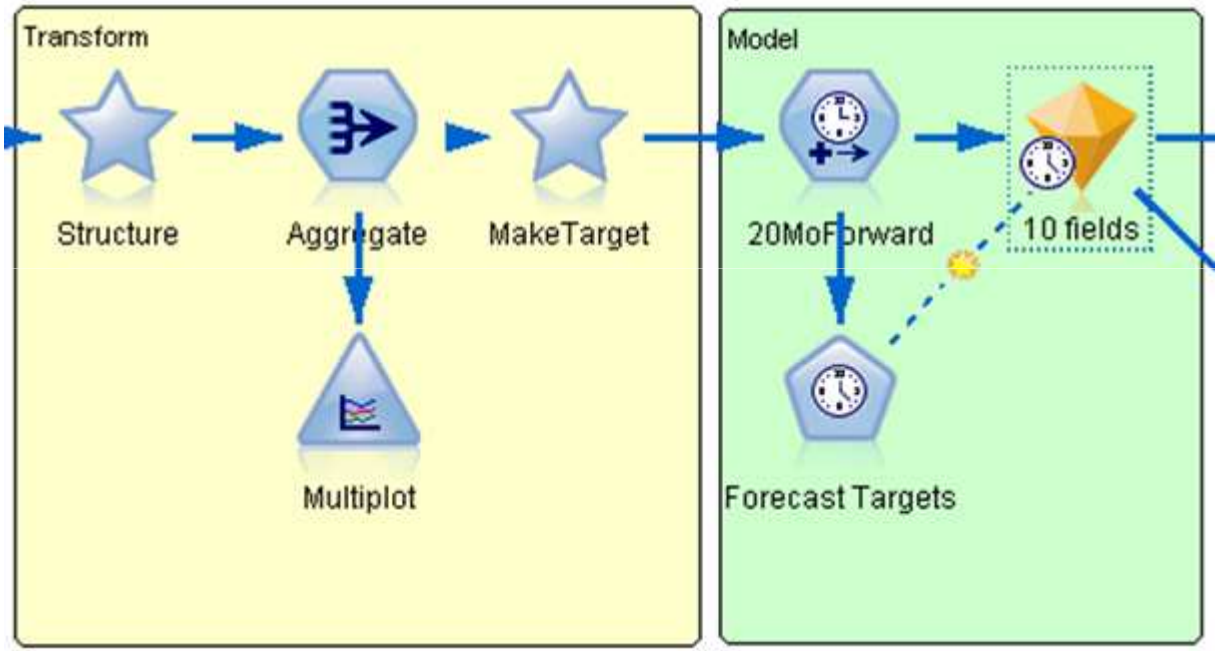
Step 3: We will develop the high quality forecast using SPSS Modeler invoking expert forecasting algorithms and adding external predictors



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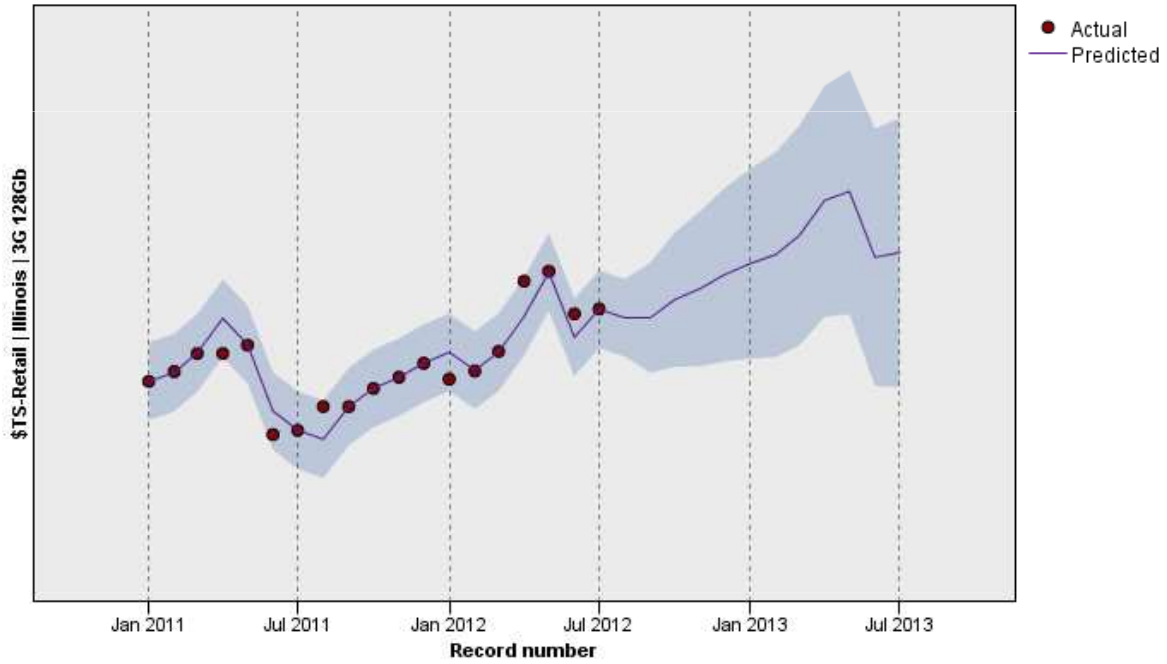
Step 4: Forecast for one product in a channel

- Seasonality reflected in predicted trend line
- Dark grey band represents the upper & lower confidence of prediction
  - This gives analyst insight into quality of supply chain predictability



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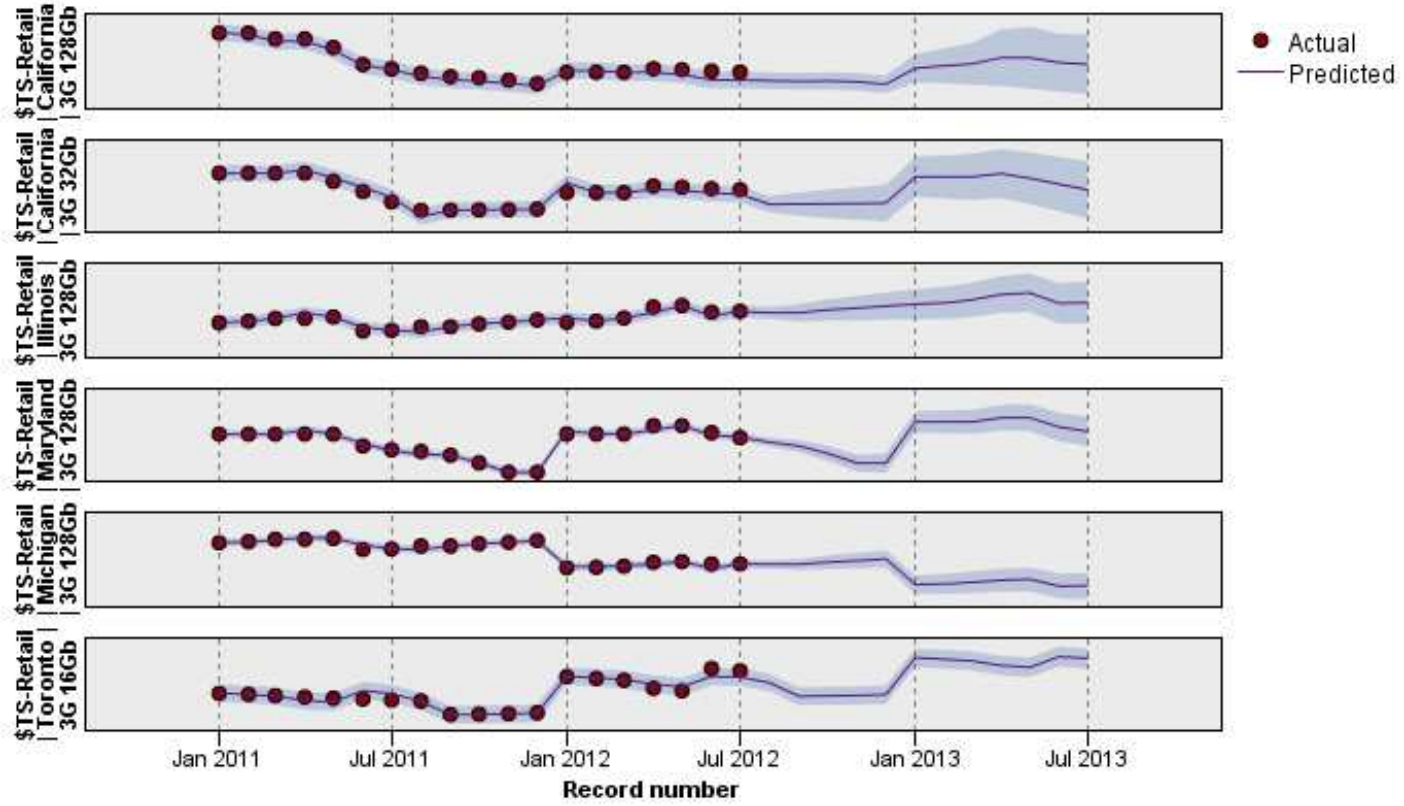
Step 4: Forecast for multiple products across a channel

- Forecast can be created for any type of time series data set



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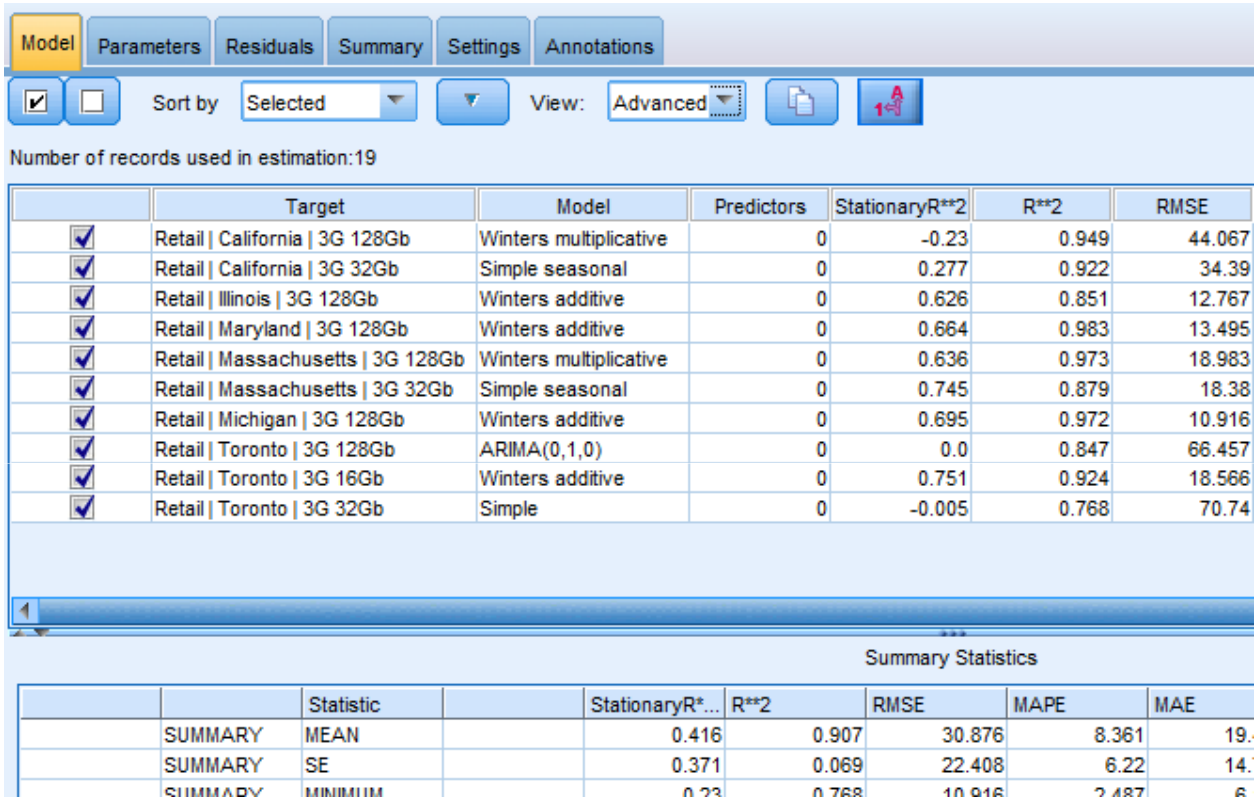
Step 4: Output Statistics



	Target	Model	Predictors	StationaryR**2	R**2	RMSE
☑	Retail | California | 3G 128Gb	Winters multiplicative	0	-0.23	0.949	44.067
☑	Retail | California | 3G 32Gb	Simple seasonal	0	0.277	0.922	34.39
☑	Retail | Illinois | 3G 128Gb	Winters additive	0	0.626	0.851	12.767
☑	Retail | Maryland | 3G 128Gb	Winters additive	0	0.664	0.983	13.495
☑	Retail | Massachusetts | 3G 128Gb	Winters multiplicative	0	0.636	0.973	18.983
☑	Retail | Massachusetts | 3G 32Gb	Simple seasonal	0	0.745	0.879	18.38
☑	Retail | Michigan | 3G 128Gb	Winters additive	0	0.695	0.972	10.916
☑	Retail | Toronto | 3G 128Gb	ARIMA(0,1,0)	0	0.0	0.847	66.457
☑	Retail | Toronto | 3G 16Gb	Winters additive	0	0.751	0.924	18.566
☑	Retail | Toronto | 3G 32Gb	Simple	0	-0.005	0.768	70.74

Summary Statistics

		Statistic		StationaryR*...	R**2	RMSE	MAPE	MAE
	SUMMARY	MEAN		0.416	0.907	30.876	8.361	19.
	SUMMARY	SE		0.371	0.069	22.408	6.22	14.
	SUMMARY	MINIMUM		-0.23	0.768	10.916	2.487	6

- Unique algorithm and forecast is created per channel (Model column)
- Stationary R**2 is a measure of accuracy, closer to 1 is good.
- Its an estimate of the proportion of the total variation in the series that is explained by the model.

- The statistical output gives an analyst great information, even if the numbers are ‘bad’
  - Good = Potentially means marketing is working in the channel
  - Bad = Evidence of turmoil in supply chain, opportunity for discovery

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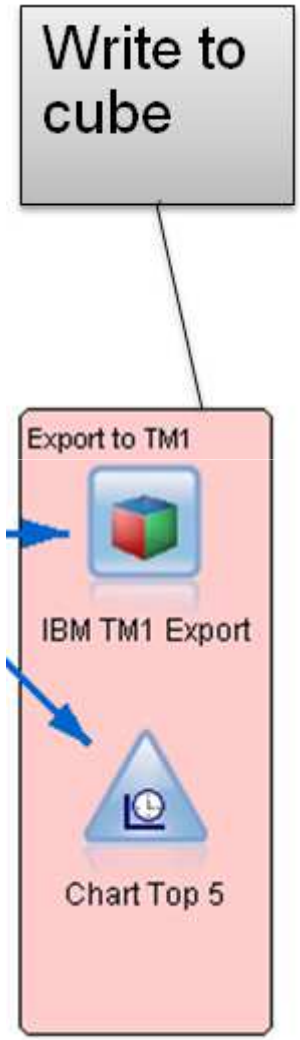
Step 5: We will push these results back to TM1



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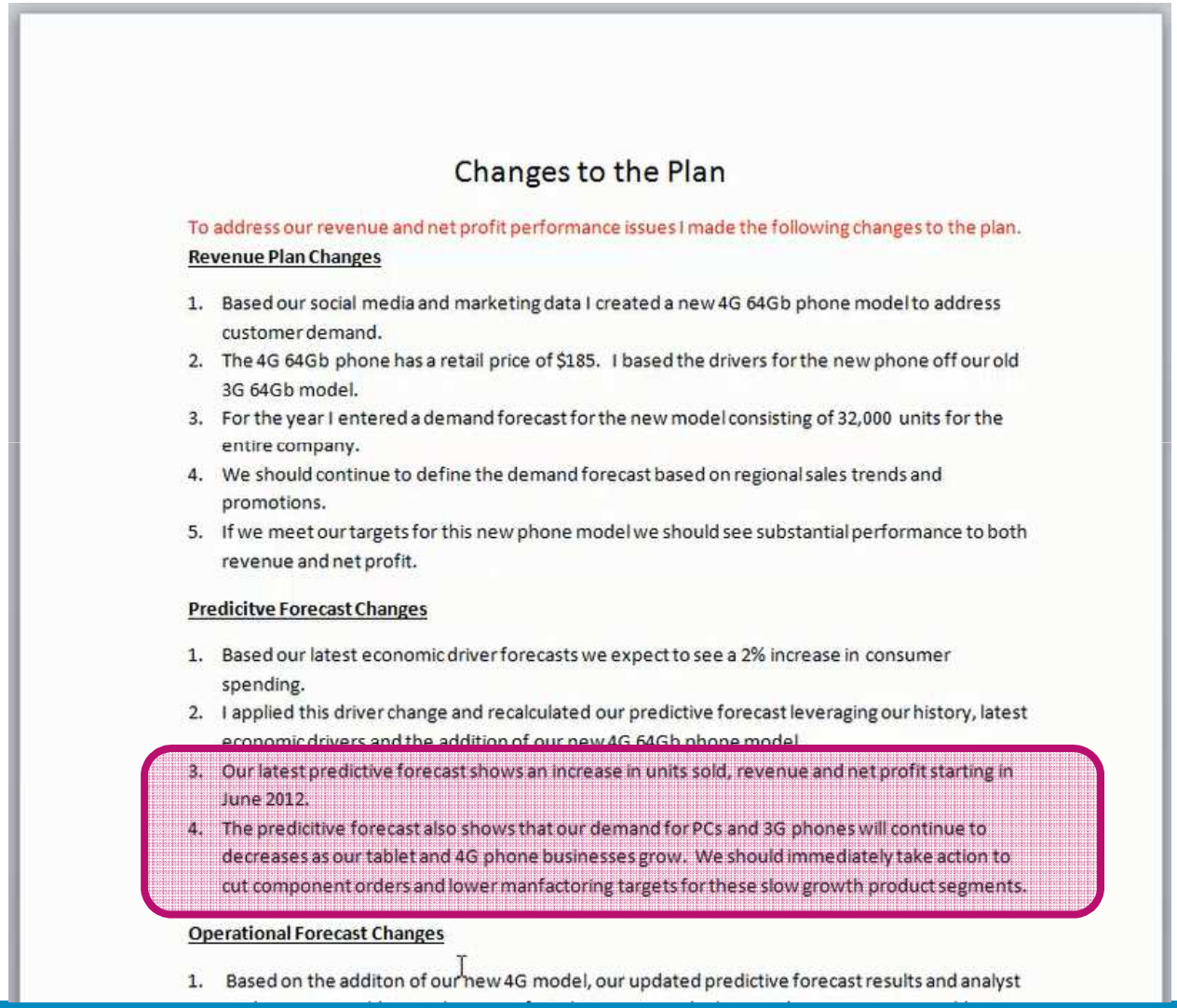
Acting on the new insights



Changes to the Plan

To address our revenue and net profit performance issues I made the following changes to the plan.

Revenue Plan Changes

1. Based our social media and marketing data I created a new 4G 64Gb phone model to address customer demand.
2. The 4G 64Gb phone has a retail price of $185. I based the drivers for the new phone off our old 3G 64Gb model.
3. For the year I entered a demand forecast for the new model consisting of 32,000 units for the entire company.
4. We should continue to define the demand forecast based on regional sales trends and promotions.
5. If we meet our targets for this new phone model we should see substantial performance to both revenue and net profit.

Predicitve Forecast Changes

1. Based our latest economic driver forecasts we expect to see a 2% increase in consumer spending.
2. I applied this driver change and recalculated our predictive forecast leveraging our history, latest economic drivers and the addition of our new 4G 64Gb phone model.
3. Our latest predictive forecast shows an increase in units sold, revenue and net profit starting in June 2012.
4. The predicitive forecast also shows that our demand for PCs and 3G phones will continue to decreases as our tablet and 4G phone businesses grow. We should immediately take action to cut component orders and lower manfactoring targets for these slow growth product segments.

Operational Forecast Changes

1. Based on the additon of our new 4G model, our updated predictive forecast results and analyst

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Summary

- Harder planning questions can now be answered
  - Integrate predictive analytics in the planning process
  - Use advanced techniques to get accurate and granular forecasts
  - Add external data to improve the forecasts
- Leading companies have started on this journey already with quick benefits
- The technology is ready to support this
- *What hard planning question would you like to answer next?*

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Questions?

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